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IN THIS ISSUE

THE association between environmental conditions and death rates, especially infant mortality, has been demonstrated in many studies, both in this country and abroad. In the article "An Inter-Racial Study in Social Conditions and Infant Mortality in Cape Town," Dr. Harry T. Phillips presents data for this South African city of nearly half a million population of which the majority is non-white, or non-European. Socio-economic conditions of the European and non-European segments of the population are described and infant mortality of the two groups is compared. Although the infant death rate for non-Europeans was four times that of Europeans in 1950–1953 (103 and 26 per 1,000 live births), the marked decrease in the rate for non-Europeans, as well as for Europeans, during the previous thirty years is indicative of improved environmental conditions and of the importance of socio-economic factors in infant mortality.

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Statistical bureaus in many health departments are no longer only places for registration of births and deaths, but have added to their services the important functions of analyzing vital statistics and special data of significance for program planning and for adjusting health service activities to the changing needs of a community. At a recent meeting of the New York Area Chapter of the American Statistical Association a report "Public Health Statistics in New York City on the Ninetieth Anniversary of the Board of Health" was presented by Carl L. Erhardt, Director of the Bureau of Records and Statistics. In his report on the activities of the Bureau, which is published in this issue of the *Quarterly*, Mr. Erhardt has emphasized the

many special investigations that have contributed, or are expected to contribute in the future, to better understanding of health problems in the community and to improving practices and methods for providing services for controlling these health problems.

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At the same meeting of the New York Chapter of the American Statistical Association, Mortimer Spiegelman of the Metropolitan Life Insurance Company turned his attention to some of the unsolved health problems and suggested areas for special studies to broaden our knowledge. His discussion is reported in the article entitled "New Frontiers in Medical Statistics." More intensive study of the relation between social factors and disease, especially the chronic illnesses, with long-term observations of populations, and continuing studies of needs for medical care and of availability of medical services are suggested, among others, as approaches to solving some of the problems.

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The National Health Survey of 1935–1936 indicated a rather sharp inverse relation between socio-economic status and amount of illness. There is a distinct dearth of more recent data on the subject. The desire to learn whether the traditional relationships have persisted despite the "continuing and increasing economic prosperity" and the "growth in the use of health insurance and increasing control of communicable diseases" prompted Dr. Saxon Graham and his colleagues in the Department of Biostatistics at the University of Pittsburgh Graduate School of Public Health to undertake a field study in June and July of 1954 among a sample of 3,403 persons in Butler County, Pennsylvania. The results are reported in the article "Socio-Economic Status, Illness, and the Use of Medical Services."

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A paper "Attitudes of Females Toward Family Planning in A Maharashtrian Village" is presented in this issue by William

A. Morrison of the Department of Rural Sociology of the University of Connecticut. The analysis is based upon a field survey conducted in Badlapur, a village of Bombay State, India. In the July, 1956 issue of the *Quarterly* the author presented a similar analysis of the attitudes of males in this area toward family planning. The two samples include, but are not restricted to, husband-wife combinations.

AN INTER-RACIAL STUDY IN SOCIAL CONDITIONS AND INFANT MORTALITY IN CAPE TOWN

HARRY T. PHILLIPS, M.B., CH.B., M.D. (CAPE TOWN), D.P.H.[1]

THE official health reports of many cities provide a most valuable source of untapped socio-medical data. Those of the City of Cape Town, South Africa, over the past half century are of particular interest. Since the appointment in that City of a full-time Medical Officer of Health in 1901, annual reports have supplied public health information for white and nonwhite populations separately. These reports have been of a high standard and provide a revealing record of the trends in public health of two halves of the population of a single city.

An inter-racial study of the trends in public health in Cape Town shows that there have been marked contrasts between the two "races" with the vitality of nonwhites being considerably lower than that of whites. (Brock, 1949; Phillips, 1956) It is possible that some of these inter-racial differences in vital statistics were due to variations in the accuracy of reporting and census enumeration. There is some evidence, which will be discussed below, that this was the case. It is also possible that part of the racial differences was due to genetic influences. However, the great accumulation of scientific reports which correlates the way of life of communities and their various indices of health makes it more important for us to examine the environmental differences before seeking genetic explanations.

In this study, therefore, comparisons will first be drawn between the social backgrounds of white and nonwhite sections of the population of the City of Cape Town, and, thereafter, the various indices of mortality in infancy will be contrasted.

BACKGROUND OF THE POPULATION

Cape Town is situated on the shores of Table Bay on the

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southwestern seaboard of the continent of Africa. Its climate is mild, and consequently tropical diseases, except for imported cases, are absent, and therefore do not complicate the epidemiological picture.

In 1652 white settlers established a small vegetable garden guarded by a fort on Table Bay for the benefit of the sailing ships of the Dutch East India Company. Today the City and its suburbs extend for twenty-six miles along the slopes of Table Mountain, with an important area of the City spreading out over the low-lying sandy Cape Flats. Originally a series of small municipalities, the City of Cape Town was formed by the amalgamation of several of these local authorities in 1913. Since then, there have been relatively minor additions to the area of the municipality. Until recently, there were no legal provisions for residential segregation on racial grounds, and the white and nonwhite elements generally lived in fairly well-defined, but contiguous, areas in much the same way that poor and well-to-do are separated in any large city in other countries. A certain degree of residential segregation has, however, been produced by the erection of publicly financed or subsidized townships or barracks for various specific racial groups.

Ethnic and Cultural Backgrounds. Officially the population of the City consists of four main racial elements: (1) "White" or "European"—mainly of stock originating in Holland and Britain, but many other European countries have also contributed; (2) "Colored" or "Mixed"—descended from slaves (imported from various parts of Africa or Asia), indigenous African peoples (mainly Hottentot), and Europeans; (3) "Natives" or "Bantu"—members of several Bantu tribes, many of them young men living within the City as migrant laborers and having no family ties locally; (4) "Asiatics"—predominantly migrants and their families from India. In South Africa white and nonwhite populations are usually referred to as "European" and "non-European."

Both White and Colored have been associated with life in Cape Town for over 300 years, and for the most part they share

language and religion and are of the same culture generally. To quote from the conclusion of an authoritative history on the subject of the Cape Colored, "The Coloured do not appear to differ from us (Europeans) today in anything except their poverty." (Marais, 1939) Approximately one-fifth of the Colored population, however, is Malay, and differs somewhat from the rest of the group in being adherents of the Moslem faith.

On the other hand, the Natives are comparative newcomers to the City. Although an increasing number of them have become detribalized and live settled family lives, among them are large numbers of men living away from their families under makeshift conditions in barracks, shanties and slums. Because of these poor social circumstances and because many Natives live in the area illegally, vital statistics such as census enumeration and birth registration for this group are generally considered unreliable.

The small group of Asiatics are also fairly recent immigrants. In Cape Town they are mainly small traders and enjoy on the whole better economic conditions than other nonwhite people do. Their differences in religion and culture are maintained by their close family and community life.

The growth of the population of Cape Town must be viewed

Table 1. Population of City of Cape Town by race groups, 1921, 1936, and 1951.

	1921	1936	1951
	NUMBERS IN THOUSANDS		
Europeans	101.7	150.8	186.7
Non-Europeans	81.7	144.1	254.5
Colored	75.0	127.6	207.5
Asiatic	2.2	3.5	6.8
Native	4.5	13.0	40.2
	PER CENT		
Proportion of Non-Europeans Who Were of Colored Group	92.1	88.5	81.5

Source: Based on Official Censuses of the Union of South Africa.

against the South African background because the City grew not only by natural increase and by immigration from overseas, but also as a result of the drift from rural to urban areas. This urbanization was the outcome of the industrial expansion of the country, initially as a result of the development of diamond and gold mines inland, but greatly stimulated by the two world wars. The population of Cape Town at various censuses since 1921, by racial group, is shown in Table 1.

It can be seen that in recent years the non-European population has been increasing more rapidly than the European. Part of this rapid growth was due to the recent inclusion within the municipality of small peri-urban areas predominantly inhabited by non-Europeans, and part was due to the immigration of large numbers of this population group attracted by the increasing needs for labor in industries in the City. Finally, a considerable part of the more rapid non-European increase was attributable to their falling death and high birth rates, and the consequent greater rate of natural increase as compared with that of the Europeans.

Since the Coloreds formed such a large proportion of the non-Europeans, vital statistics for the latter group represent chiefly the Colored people. It will, in fact, be seen later that the increase in percentage of Natives, while large, did not greatly affect the various total rates and trends.

Socio-Economic Background. A number of surveys have given quantitative expression to the obvious fact that non-Europeans were economically worse off than Europeans in Cape Town. Batson (1942) reported that in a household survey conducted in 1938–1939 it was found that "of every ten Colored households, five were below the Poverty Datum Line; of every ten Native households, five; of every ten Asiatic households, two or three; of every ten European households, less than one." The Poverty Datum Line was defined as "that expenditure which is necessary to procure at the current prices of the district those quantities of food, clothing, fuel and lighting, and cleaning materials which are essential for the health and de-

cency of the members of a given household." In a follow-up survey, Batson (1954) reported that the percentage of Colored households living below the Poverty Datum Line diminished from 53 in 1938 to 33 in 1951.

Occupation. Apart from the conventional "color bar," non-Europeans were restricted occupationally by a number of legal and educational barriers. (U.G.[2] 53/1948) This resulted in marked differences in the distributions of Europeans and others in better-paid jobs.

Housing. The first full-time Medical Officer of Health of Cape Town deplored the shortage of housing for "the mass of the working classes" of Cape Town in his first report for the year 1901–1902. Several surveys and censuses since then have shown that the Colored population were worse off in this regard than the Europeans. Despite the efforts of the municipal authorities in building sub-economic houses, the percentage of Colored households which were overcrowded, judged by lenient standards, increased from 38 to 44 during the period from 1938 to 1951. (Batson, 1954) Although no figures are available, it is more than likely that the position for Europeans was better, and that for Natives worse, than that for the Coloreds.

Nutrition. There is no scientifically documented evidence that non-Europeans are less well-nourished than Europeans in Cape Town, but the differences in income, occupation, and educational standards, and the differential incidence of nutritional syndromes in hospitals and clinics make it inevitable that this is so.

Social Welfare Services. There have been gross disparities as between race groups in the amount of public money spent in South Africa on social security services. In 1943, the funds per capita per annum spent were 4 pounds for Europeans, 1 pound for Colored and Asiatics, and 1 shilling (equaling 1/20 of 1 pound) for Natives—a ratio of 80:20:1. (U.G. 14/1944) Despite the greater poverty among the non-Europeans in Cape Town, in 1939 there were 83 social welfare organizations serv-

[2] Union Government.

ing Europeans, and only 52 serving non-Europeans. (Batson, 1942)

Education. Official and other records show that, compared with European children in South Africa, non-European children were at a disadvantage with regard to proportions of school-age children attending school and reaching higher grades, standards of teaching, expenditure on education, facilities for higher and vocational education, etc. (U.G. 54/1937; U.G. 53/1948; Patterson, 1953)

Health Services. Preventive non-personal and personal health services are provided by the City Health Department to both Europeans and non-Europeans on an equal basis and there is evidence that non-Europeans have been utilizing these services to an increasing degree. (Phillips, 1956) In-patient services at public expense, provided mainly by the Provincial Authorities, were deficient in terms of hospital beds available for both sections of the City's population. This deficiency for Europeans was largely, or possibly entirely, made up by beds available in private hospitals or nursing homes, but this was certainly not the case for non-Europeans whose poverty, bad housing, high birth and mortality rates, and lack of education increased their relative needs for hospitalization and lessened their ability to pay for private services. (Phillips, 1956) An index of this inter-racial difference is given by disparity of the proportions of Europeans and non-Europeans who died in institutions (Table 2).

Reproductive Rates. Throughout the period under review,

Table 2. Proportions of deaths by race which occurred in institutions, Cape Town, 1914–1919 and 1949–1953.

Period	Europeans		Non-Europeans	
	Number of Deaths	Per Cent in Institutions	Number of Deaths	Per Cent in Institutions
1914–1919	7,116	23.1	14,980	9.3
1949–1953	7,192	41.5	14,537	26.0

Source: Based on reports of Medical Officer of Health, City of Cape Town.

there have been marked differences in the reproductive rates of Europeans and non-Europeans. Whereas those of the former group were similar to the rates seen in other urban western communities, those of the latter have been considerably higher. In the period 1911–1920, the average crude birth rates for the two groups were 26.5 and 46.6 per thousand respectively. Except for a slight rise in the period 1940–1949, the rate of Europeans has steadily declined, and for the period 1950–1954, averaged 18.2 per thousand. That for non-Europeans has also declined, and by 1950–1954 it averaged 39.9 per thousand. The reproductive differences between the various race groups are more accurately reflected by correcting for age and sex distribution in the population, i.e., by calculating the number of births per thousand females in the reproductive age group in each race. This has been done for the year 1946, the only year in which all the necessary data are readily available. The markedly higher birth and motherhood rates among non-Europeans is readily seen. (Table 3.)

Additional light on the inter-racial differences in reproductive behavior are provided by statistics on illegitimacy. The proportion of registered births which occurred outside of legally recognized marriages has been much higher among non-Europeans than Europeans. In 1913–1916, the averages were 25.8 and 7.0 per cent respectively. In recent years, data are available for the four races separately. The rate for Europeans has

Table 3. Reproductive rates by race in City of Cape Town, 1945–1947. (Annual Average.)

	Crude Birth Rate 1945–1947	Live Births Per 1,000 Females Aged 15–44 in 1946
Europeans	20.8	75.4
Non-Europeans	44.7	158.7
Colored	46.2	160.9
Asiatic	35.7	205.3
Native[1]	35.8	133.7

[1] Considered to be inaccurate because of under-registration of births and under-enumeration at censuses in this group.

Source: Calculated from data derived from the Annual Reports of the Medical Officer of Health, Cape Town, and the official census of the Union of South Africa, 1946.

been halved in the past forty years, but that for non-Europeans has remained at approximately the same level. Even when Colored births were separated from those of other race groups, there was little evidence of a decline in the rate for this period. It is also striking that the illegitimacy rate as recorded among Asiatics in recent years was only 0.7 per cent—less than one quarter of that among Europeans. It should be noted that the under-registration of births among Natives mentioned above may affect the calculated illegitimacy rate for this group.

General Mortality. Mortality rates have also shown marked inter-racial differences. For Europeans and non-Europeans, the crude death rates in the period 1911–1920 were 13.8 and 32.0 per thousand respectively. In both groups, there has been a marked decline, and in the period 1950–1954 the rates were 9.5 and 13.8 for Europeans and non-Europeans—representing reductions of 31 and 57 per cent respectively. It is of interest to note that in the latter period the average rates for Colored, Asiatics and Natives were 13.3, 8.9 and 18.7 respectively.

On the data available for 1951, the latest census year, it is possible to allow for differences in age and sex for only the Colored element of the non-European population for comparison with the European rate. If the death rate for Coloreds in 1951 is standardized on the basis of the age and sex distribution of the European population in the 1951 census, the rate is 19.1 compared with 9.5 for Europeans. If the Colored population's structure in 1951 is used as a basis, the rates are 14.3 and 4.9 respectively.

Inter-Racial Comparison of Mortality in Infancy

With such marked contrasts in the socio-economic backgrounds of the four races in Cape Town, it is of interest to compare the various indices of mortality in infancy in these groups during the past forty years. The stillbirth, infant mortality and neonatal death rates, and the mortality rate of infants in their second year of life have been used in this comparison and have been derived from the official Annual Reports of Medical

Officers of Health of the City, or have been computed from figures provided therein. (City of Cape Town, 1913–1954)

The following definitions have been used: (1) Stillbirth Rate—the number of stillbirths per thousand total births per annum; (2) Infant Mortality Rate—the number of deaths under one year of age per thousand live births per annum; (3) Neonatal Death Rate—the number of deaths under four weeks of age per thousand live births per annum; and (4) the Mortality Rate in the Second Year of Life has been calculated from the number of deaths in this age group and the number of births (less the deaths under 1 year) in the previous year.

Table 4. Stillbirths and infant mortality—Cape Town, 1913 to 1953. (Annual averages.)

Quinquennium*	Stillbirths (Average)	Live Births (Total)	Stillbirth Rate	Neonatal Death Rate	Infant Mortality Rate
	EUROPEANS				
1913–1918 (a)	96.6	11,382	41.5	39.0	89.4
1918–1923	90.6	12,148	35.9	29.9	89.5
1923–1928	83.0	12,992	31.0	24.0	67.4
1928–1933	97.6	14,342	32.9	24.8	60.6
1933–1938	83.0	13,477	29.9	23.2	43.8
1938–1943	86.8	15,600	27.1	21.7	41.0
1943–1948	81.6	18,666	21.4	20.8	33.8
1948–1953 (b)	50.2	17,445	14.2	16.6	26.6
Reduction (a) to (b), Per Cent	—	—	65.8	57.4	70.2
	NON-EUROPEANS				
1913–1918 (a)	244.8	16,208	66.4	65.9	255.6
1918–1923	294.0	19,782	69.1	54.2	216.6
1923–1928	326.0	24,522	62.3	48.9	182.8
1928–1933	408.0	30,676	62.4	48.4	157.2
1933–1938	348.2	33,563	49.3	34.7	132.6
1938–1943	332.4	35,265	45.0	37.3	130.5
1943–1948	334.6	41,295	38.9	39.8	122.0
1948–1953 (b)	344.0	49,958	33.3	33.4	104.8
Reduction (a) to (b), Per Cent	—	—	49.8	49.3	59.0

* In each case, the period begins on July 1st and ends on June 30th.
Source: Taken or computed from data in Annual Reports of M.O.H., Cape Town.

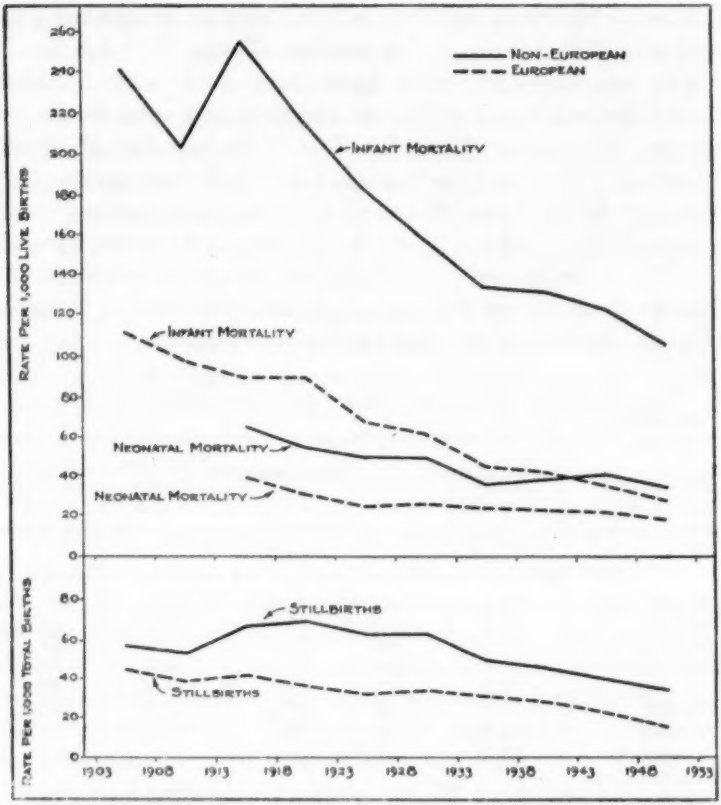

Fig. 1. Five-year average annual stillbirth, neonatal mortality and infant mortality rates for Europeans and non-Europeans in Cape Town, 1905–1953.

The stillbirth, infant mortality, and neonatal rates for Europeans and non-Europeans in the City of Cape Town from 1913 to 1953 are summarized in Table 4 and shown graphically in Fig. 1. These vital statistics show marked inter-racial differences, but unfortunately rates cannot be calculated in all cases for the three non-European races separately. Only in recent years have some of these separate statistics been published, and when available and relevant, rates for the three non-European races are given below.

Stillbirths. The rates for Europeans have consistently been lower than those for non-Europeans. For both groups, the rates began to decline definitely only after 1928–1933.

The data on stillbirths for the four racial groups separately are available from 1947 onwards. In the period 1947–1953 the average rates for Europeans, Coloreds, Asiatics and Natives were 14.8, 30.4, 33.6 and 63.9 respectively, while that for the three non-European groups was 33.7.

It is probable that the higher levels of the rate among non-Europeans, especially Natives, was partially due to under-registration of births as previously mentioned. Here again the rates for the Colored groups and those for all non-Europeans are not markedly different. From Table 4, it is evident that both European and non-European stillbirths declined considerably in the period under review. In the period between 1913–1918 and 1948–1953, the stillbirth rate declined 65.8 per cent for Europeans, and only 49.8 per cent for non-Europeans, despite the higher initial rate among the latter group.

Infant Mortality Rates. The infant mortality rates for Europeans and non-Europeans during the period 1913–1953 have already been shown in Table 4 and Fig. 1. The inter-racial rates since 1938 for the four main races shown separately are given in Table 5 in summary form.

These figures show that infant mortality rates for non-Europeans have been consistently higher than those for Europeans, but that both rates have dropped considerably in the past forty years. The quinquennial average rates used in the tables conceal the annual fluctuations in the rate. The original data revealed that there was far greater variability in the non-European infant mortality rates.

The comparison of reductions in infant mortality rates in the quinquennium 1913–1918 and 1948–1953 shows that, whereas the absolute decrease for Europeans was 52.8 and for non-Europeans, 140.8 per thousand live births, proportionate decreases were 75.2 and 59.0 per cent respectively. In other words, European infant mortality, despite its lower initial level,

has decreased relatively more rapidly. Owing to the influx of large numbers of Natives into Cape Town in recent years, especially during and after World War II, it is probably more correct to compare the infant mortality rates of non-Europeans in 1913–1918 with the infant mortality rate of Coloreds in 1948–1953. However, even when the mortality rates for Colored infants are separated from those of the other non-European groups, proportional reduction from 1938–1941 to 1950–1953 was greater among the Europeans than among the Colored population (Table 5). Among the Natives there was an actual rise in mortality in this fifteen-year period, but it is impossible to know how much of this was due to differences in completeness of registration, to chance fluctuation, or to other causes. It is interesting to note that the infant mortality rate for non-Europeans in 1948–1949 was the same as that for Europeans forty years earlier.

Neonatal Mortality. Neonatal mortality rates for Europeans since 1913–1918 have consistently been lower than those for non-Europeans in Cape Town (Table 4). In both groups there

Table 5. Average annual infant mortality rates and average annual number of infant deaths by race groups, Cape Town, 1938–1953.

Period	Europeans	Non-Europeans	Coloreds	Asiatics	Natives
	PER CENT				
1938–1941 (a)	39.8	126.3	124.9	50.0	197.1
1942–1945	38.2	135.0	127.8	55.4	227.9
1946–1949	32.7	111.0	100.0	67.6	240.7
1950–1953 (b)	25.9	103.3	91.3	43.3	227.4
Per cent Reduction (a) to (b)	34.9	18.2	26.9	13.4	−15.4
	NUMBER				
1938–1941	119	891	810	10	71
1942–1945	135	971	844	12	115
1946–1949	123	987	788	17	182
1950–1953	89	1,042	799	14	230

Source: M.O.H. Cape Town Annual Reports. (All deaths and rates are corrected for outward transfers.)

have been considerable declines in the past forty years, but the European rates have been reduced 57.4 per cent as compared with the reduction in the non-European rates of 49.8 per cent in the same period. It is apparent, too, that neonatal mortality has decreased proportionately less than has infant mortality in Cape Town and as infant mortality as a whole decreased, deaths in the first months of life became relatively more important. The proportion of infant deaths which occurred in the first four weeks of life, i.e., neonatal, as a percentage of infant mortality during the first twelve months rose from 43.6 to 62.4 per cent among Europeans, and from 25.8 to 31.9 per cent among non-Europeans during the period under review. Thus, in 1948–1953 only 37.6 per cent of European infant deaths occurred in the post-neonatal period (over four weeks but under 1 year of age) whereas 68.1 per cent of non-European infant deaths occurred in this age group.

Mortality in the Second Year of Life. An illuminating picture of the comparative health of Cape Town's infants between the ages of one and two years is provided by a series of mortality tables in the Medical Officers of Health's Annual Reports. These figures are summarized in Table 6.

It will be readily seen that the disparity between European and non-European mortality rates was even greater for this age group than for infants under the age of one. The greater

Table 6. Inter-racial comparison of mortality of infants aged 1 to 2 years.

Quinquennium	Death Rate Per 1,000 Infants Aged 1-2 Years		Ratio—Non-European/European
	Non-European	European	
1926–1931 (a)	76.7	15.2	5.0
1931–1936	67.4	12.4	5.4
1936–1941	58.8	9.4	6.3
1941–1946	65.2	5.8	11.2
1946–1951 (b)	44.0	3.0	14.7
Reduction in Rates From (a) to (b) Per Cent	42.6	80.3	

Source: Based on data in Annual Report of M.O.H., Cape Town.

discrepancy was seen not only in the actual levels of the rates but also in the rate of decline.

Hospitalization and Stillbirths. Although in theory medical and health services are provided free to all citizens of Cape Town if they cannot afford private services, in practice it has been far more difficult for non-Europeans generally to gain admission to a hospital than it has been for Europeans. This was largely due to the fact that the public hospitals have not been able to cope with the large and increasing number of non-European patients who require admission. Not only could most non-Europeans not afford to pay for private maternity and medical services, either as out-patients or in-patients as many Europeans could, but the home circumstances were also more unsuitable for domiciliary confinement or medical treatment. In addition, the actual numbers of births and deaths have been far higher for non-Europeans in Cape Town.

The total numbers of births registered and the percentages of these which occurred in hospitals in the City during the period 1947–1953 are shown in Table 7.

It can be seen that of mothers who had live-born infants during the observed period the proportion of non-Europeans that delivered in institutions was approximately half that of Europeans. In Cape Town the policy has been to admit to public maternity hospitals for delivery only those women who are

Table 7. Number and percentages of births in institutions by race, Cape Town, 1947–1948 to 1952–1953.

Race	Live Births		Stillbirths		Significance of Difference (1) and (2)
	Number Registered	Per Cent in Institutions (1)	Number Registered	Per Cent in Institutions (2)	
Europeans	21,277	72.38	322	70.81	None
Non-Europeans	58,901	36.68	2,051	44.90	Significant
Coloreds	51,370	32.44	1,606	44.46	Significant
Asiatics	1,876	37.47	64	28.12	None
Natives	5,655	84.77	381	49.61	Significant

Source: Based upon data provided in Annual Reports of M.O.H., Cape Town.

primiparae, or of high parity, or in whom complications are present or expected. Without further data on mothers, it is impossible to state how the criteria mentioned above have affected European admissions to hospitals. It is certain, however, that many more Europeans could afford admission to private maternity nursing homes and were not prevented by family ties from being delivered away from home.

The high proportion of registered Native births which occurred in institutions is interesting. The reason for this figure is probably that *all* births to Natives in institutions were registered, while many, if not most, domiciliary births remained unregistered. This gives a false impression of a high degree of institutional confinement among Natives. If the same error occurred among the other non-European races, it is likely that it was much smaller than it was among the Native group.

Stillbirths in all races were probably more completely registered than were live births because of the practical difficulty of disposing of the dead baby if the legally required certificate were not obtained. Nevertheless, many stillbirths must have escaped registration. The relative proportions of registered live births and stillbirths which occurred in institutions could still be affected by two factors. These were: (1) the completeness of registration of live births, and (2) the extent to which admission of pregnant women to institutions was determined by the presence of conditions predisposing to fetal deaths.

Among Europeans the proportions of live and of stillbirths which occurred in institutions were about the same. Assuming that birth registrations were complete, this means that the presence or likelihood of conditions which predisposed to stillbirths were not important factors in determining the admission of European women to institutions.

Among Colored women, the proportion of stillbirths occurring in institutions was significantly higher than that of live births. If under-registration of Colored live births had occurred (as it probably did to some extent), the real disparity would have been even higher. This indicated that, for them, admis-

sion to an institution for childbirth was determined significantly by the presence of factors predisposing to stillbirths, e.g., primiparity, high orders of parity, complications, premature births, etc.

For Asiatic women, the proportions of stillbirths and live births occurring in institutions were not significantly different.

Among the Natives the proportion of stillbirths occurring in institutions was very much lower than that of live births. It is highly improbable that of Native parturients those who were to have live born babies would be admitted to hospital nearly twice as frequently as those whose babies would be born dead. The reason for the unusual figures must have been the marked under-registration of those Native live births occurring outside of institutions. This is confirmed by the very high figure for percentage of Native live births in institutions. This conclusion is important because it means that vital statistics based on registered Native live or total births, e.g. birth, fertility, and infant mortality rates, must be markedly inaccurate.

The proportion of stillbirths among Europeans which occurred in institutions was markedly higher than those of the non-European races. Although other factors might have played a part in producing this difference, the inability of non-Europeans generally to pay for private institutional confinements or to obtain admission to the public maternity hospitals owing to shortage of beds were both important factors.

Discussion

The level of the infant mortality rate has for a long time been regarded as one of the most sensitive indices of the "standard of living" of the community. In recent years an extensive literature has developed relating this rate to such social factors as the nutrition, breast feeding practices, marital status, social class, frequency of childbearing, working habits, place of residence, etc. of the mother. Attention has also been given to the association between these factors and stillbirths and neonatal and post-neonatal death rates. The secular trends of infant

and other mortality rates in particular social groups, or under special circumstances, have been reported. In all these studies it has been found that adverse environmental conditions were associated with higher casualty rates among infants and that improving conditions were accompanied by declines in all these rates. In general, the post-neonatal death rate has fallen more than the neonatal and stillbirth rates. Much of this work has been ably summarized by the United Nations Department of Social Affairs (1954).

The association between social environment and fetal and infant mortality is complicated by the fact that certain biological factors such as age and parity of mother are also closely related to such mortality. (Sutherland, 1949; Heady, et. al., 1955) Thus, primiparity, high parity, and motherhood at the extremes of the reproductive age have been found to be associated with elevated rates of mortality.

The separation of these factors into social and biological groups is an artificial one. Such groups are usually closely related to each other. The age and parity of the mother and the size of her family, for instance, are influenced to a very considerable extent by social and economic factors. Overcrowding, nutrition and the quantity and quality of maternal care, on the other hand, are all closely linked with size of family. It is therefore impossible to separate biological from social influences to any great extent since one group of factors so often activates the other.

In the City of Cape Town there is ample documentary and other evidence that non-Europeans have been worse off than their European fellow-citizens as regards economic status, housing, educational standards, availability of social assistance, and utilization of private and public medical services. In addition, there is evidence that non-European women generally have considerably larger families with the probability that they tend to reproduce from an early age until the later years of the reproductive period. Their high illegitimacy rate is evidence of a frequent lack of family stability and often of maternal

care. But even among legitimate infants the mortality rate has been higher among non-Europeans than among Europeans. (In 1946–1953 the infant mortality rates for legitimate infants among Europeans and non-Europeans averaged 23.7 and 85.9 respectively.)

The post-neonatal death rate has generally been found to be sensitive to the environment and to decline relatively more than the neonatal death rate when socio-economic circumstances improve. In both sections of Cape Town's population this phenomenon has been observed, but the decline has been more marked among Europeans.

The adverse circumstances which are presumably responsible for the high post-neonatal rate among the non-European infants appear to persist into the second year of life. In fact, the disparity in mortality rates between infants of the two race groups was even greater in the second year of life than it was in the post-neonatal or any other period. It seems that the mortality rates of infants one to two years of age are even more sensitive indices of social conditions than those of younger infants. If this is so, it is significant that the ratio between the mortality rates for non-Europeans and Europeans in this age group has been increasing considerably, even though some allowance must be made for errors due to the way the rates were calculated and the effects of greater under-registration of non-European births.

In both groups of the popultion there have been substantial reductions in the various mortality rates of infants over the past forty years. The rates for European infants have followed trends similar to those for infants in other western communities. Those for non-European infants have declined considerably less despite the high initial rates, and the presumably greater incidence of deaths due to preventable causes. Although it is possible that hereditary factors account for some of this disparity, the great improvement in the health of both groups in the space of one generation lessens the importance of any such genetic factors and stresses the fact that, as between races,

biological similarities are far more important than differences.

In Britain, Titmuss (1943), Morris and Heady (1955), and Illsley (1955) have observed that decline in infant mortality among the lower socio-economic classes has not kept pace with that among the well-to-do. Morris and Heady suggested, among other possibilities, that this was one expression of the time lag in the better utilization of money and other resources as economic circumstances in families improved. Illsley showed that, with the improvement of economic conditions, there was a considerable "upward" social mobility and suggested that the less physically and mentally fit women remain in the lower occupational groups, which causes the decline in infant mortality to be slower in these groups.

In Cape Town a number of similar sociological factors can be suggested. The effect of selective mobility between racial groups, or "passing over," could only have been very small, but the influence of migration into the City must have been very important. Among Europeans the immigrants of necessity would have been skilled workers or members of professional or business groups, since unskilled workers are rare in the white group. Among non-Europeans, on the other hand, unskilled workers and their families from rural areas constituted the majority of immigrants, and their large numbers considerably diluted the existing core of settled Colored people. It is likely, too, that the social, conventional, and legal disabilities of non-Europeans have helped to retard their progress generally, and prevented the declines in their infant mortality rates from being proportionate to those of Europeans.

The inter-racial differences in the proportions of Europeans and non-Europeans who died or who were born in institutions in Cape Town have been demonstrated and commented on above. These differences illustrate the economic inability of the non-Europeans to purchase, or the community to provide, the medical facilities required for the maintenance of optimum health. Altenderfer and Crowther (1949) have shown that in the United States the stillbirth and infant mortality rates were

associated with the degree of hospitalization available in the community, and point to the fact that what is important in these communities is not hospitalization *per se*, but the general medical and health facilities that are available to the community.

Summary

Health statistics for the City of Cape Town, South Africa, are available over the last forty years for "European" (white) and "non-European" (nonwhite) populations separately and show marked interracial differences. In more recent years, certain of these statistics for the three separate non-European groups are also available.

In this study, comparisons are, in the first place, drawn between the social backgrounds of the two main sections of the City's population. Non-Europeans were at a disadvantage as regards income, occupation, housing, nutrition, and social welfare, education, and medical services. Their reproductive and death rates have been higher than those of Europeans, whose vital statistics have generally kept pace with those of other western communities. Much higher proportions of non-Europeans were born and died outside of institutions, although the disproportion has decreased somewhat in the last forty years. Among non-Europeans generally the incidence of illegitimacy has been much higher than among Europeans, but there were marked differences among the various non-European races.

Against this background, the stillbirth, neonatal, post-neonatal, and infant mortality rates and mortality of infants in the second year of life in the various race groups are compared. All these rates are found to have been lower and to have declined more among Europeans during the past three or four decades. Of all these statistics the greatest disparity occurred in the mortality rates in the second year of life and there was evidence that inter-racial differences have increased in recent years.

The differences in mortality in infancy have been related to hospitalization. The significance of some of these inter-racial differences has been discussed in the light of changing social conditions.

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PUBLIC HEALTH STATISTICS IN NEW YORK CITY ON THE NINETIETH ANNIVERSARY OF THE BOARD OF HEALTH[1]

CARL L. ERHARDT[2]

TONIGHT we mark the ninetieth anniversary of the first meeting, on March 5, 1866, of the Board of Health of the City of New York. It is not my intent to provide a lengthy discussion of vital statistics in 1866 and their comparison with the present day. Much literature on long-term trends in birth and death rates is already available and the phenomenal changes that have occurred are quite familiar. The occasion, rather, offers the opportunity to discuss the changes in vital statistics practices that New York City has introduced during recent years, and to outline briefly some of the other aspects of the Department of Health's statistical program.

A ninetieth anniversary is perhaps an appropriate time to take a look at ourselves. Even a little "pointing with pride" may be forgiven on a birthday. Some of you will be familiar with much that I am going to say; all of you, I hope, will get some insight into what the Department of Health is trying to do in its statistical program. Because of time restrictions, it will necessarily be a sketchy and limited view. Basic research, such as that conducted by the Public Health Research Institute, is not included in this discussion. As an operating agency, we place emphasis naturally on statistics needed for program planning, administration, and evaluation. Constant promotion of the use of modern statistical methods by the several bureaus of the Department has been part of the job. Most of the bureaus now prepare simple and routine statistical reports on the basis of established patterns. Experienced professional statistical time is hence largely reserved for assistance in designing

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data collection and analytic procedures for new programs or for special studies.

A substantial portion of our present program still relates to births and deaths. These were almost the sole statistical source of the Department of Health's data ninety years ago. The number of births reported for the entire year 1866 was about 11,000, less than one-third of the 34,000 births estimated to have occurred in the City that year. (1) The Department concerned itself first with improvement of birth registration. Fewer than 400 births were being reported monthly to the Office of the City Inspector, the predecessor agency. By the end of 1866, nearly 1,200 births were being registered monthly, about three times the earlier number. With about 165,000 births occurring in New York City each year now, we know that few are unreported. Our aim lately, therefore, has been to improve the quality of the data and to utilize birth and death records for more than simple counts of events. We are trying to provide the medical profession with additional details regarding these events, details intended to provide the Department with more precise program guides and the profession with leads for clinical investigation, leads that are possible in unbiased fashion only from community-wide data. Some changes in registration practices may be of interest as they relate to improvement in accuracy of the data on the records and also as they reflect the development of social conscience with respect to the children whose births are recorded.

Registration Practices

In New York City, contrary to the practices everywhere else in the country until a year ago, the superintendent of a hospital is responsible for preparing and filing records of birth for children born in his institution. (2) More than 99 per cent of the births occur in hospitals nowadays. In most hospitals the staff customarily prepares the record for the physician's signature, and the Board of Health recognized existing practice in the law. The control problem of insuring that all births are re-

ported was thus simplified for the Department, since it need only supervise some 100 hospitals rather than thousands of physicians. Moreover, the data needed for the birth record, both identifying and medical information, is on the hospital record or should be. In 1955, New Hampshire adopted this practice also (3) and other states may follow suit in future.

Another registration procedure, intended initially to encourage complete birth registration, is the transmittal to the mother of each newborn infant a certificate attesting that the birth record for the child has been filed. (4) In former days this certificate was a handwritten extract of selected information. In the 40's, however, it was realized that practically all births were being reported; this certificate was therefore redesigned by making it a complete copy of the entire face of the record. The present purpose is to induce the parents to report immediately any errors in order to insure the child a correct record when a copy is needed and to improve the statistical data derived from these records.

In the late 30's, the State Legislature provided for the filing of a completely new birth certificate whenever a child has been adopted or has been legitimized by marriage of its parents subsequent to its birth. (5) More recently, the Board of Health has allowed the filing of a completely new birth certificate for a child whose father acknowledges its paternity even though he is not married to the mother. (6) We are also notified whenever a court in the State has handed down a determination of parentage, and in these cases, too, a new birth certificate is prepared for the child. (5) These procedures allow the child to have a straightforward birth certificate indicating the facts as they have been legally established. Hence, the child will not have to make continuous explanations when he uses the record. From data on the birth certificates of adopted children a study of their characteristics has been made: age at adoption, sex, color, and the like. (7)

New York City remains the only community that provides for a confidential medical report on cause of death. It has

been difficult to demonstrate that better information is obtained by this mechanism, but it is the only means for avoiding the situations said to account for misstatements of the facts. Moreover, this form of report is an appropriate method of medical certification in view of the confidential relationship between physician and patient. (8)

For better service to the public, we have been able to prevail upon the Budget Director to provide about $50,000 annually over several years to prepare new indexes to the birth records from 1880 to 1909. We are also considering the transfer of the old records of 1804 to 1865 to the Municipal Archives as documents essentially of historical and genealogical interest.

Vital Statistics

On the medical statistics side of the picture, the New York City Department of Health was the first agency in this country which included with the birth certificate a confidential medical report of the facts regarding the mother's pregnancy and delivery. (9) The items in these reports have changed over the years: new ones are added as need for them is seen; changes in the questions are made in order to get more precise information; items are eliminated when they have served their purpose or when they do not provide the information expected of them initially. From the information contained in these medical reports some of the earliest community-wide studies of infant mortality by weight at birth, of the extent and influence of operative interventions, of complications of pregnancy, and of the extent of prenatal care have come out of New York City's Health Department. (10–14) To have a convenient method of measuring the effects of some of these factors on infant mortality, New York City developed the system of combining the data on infant deaths with information regarding the parents and medical history of the pregnancy and delivery as reported on the corresponding birth certificate.

Most of you are familiar with the use of small area statistics for localization of problems. During the Bureau's early history

much use of ward statistics was made and advantage was taken of census tract data as soon as the population facts were collected on such a basis. Vital statistics for health areas are continuously available for about thirty years. It is hoped that such small area data can be utilized to a greater extent in future for investigations of the influence of socio-economic status on health conditions. Another statistical maneuver early introduced was allocation of vital events according to residence, first done in 1905.

About 1938, the New York City Department of Health decided on an intensive campaign to encourage reporting of all fetal deaths regardless of period of gestation. It later abandoned the restrictive term "stillbirth" in favor of the inclusive and descriptive term "fetal death." (15) Each succeeding year has seen increases in the number of fetal death certificates filed, (16) but it is only in the past few years that we have felt the data sufficiently well reported to warrant some reasonably intensive analysis. (17) A more recent paper discusses the relative incidence of ectopic pregnancy by age, parity and race of the mother, and similar data for presumably spontaneous fetal deaths at less than twenty weeks gestation. (18) It is perhaps of some interest that the World Health Organization in 1950 recommended that all terminations of pregnancy, regardless of period of gestation, be reported to the health department, and adopted the term "fetal death" to describe any termination of pregnancy not producing a live born infant. (19)

A few years ago we were impressed by Dr. Sigismund Peller's thesis that late fetal deaths and neonatal deaths were subject to much the same influences and that, consequently, these two types of reproductive loss should be considered as an entity. (20) Moreover, we were disturbed, as most people are who work in this field, by the vagaries of stillbirth and infant mortality statistics that resulted from varying definitions of the term stillbirth. For the past six or seven years therefore perinatal mortality rates have been utilized to measure reproductive loss around the time of birth. (17) This concept is also being

used to assess differentials in such loss between hospitals. (21)

To increasing extents resort is had to vital statistics for medical research purposes outside of the Department of Health and the Department is anxious to cooperate in any way, within its limitations, in such studies. The Board of Health and the Commissioner, under authority granted by the Board, have approved our supplying data for nearly 100 such clinical and statistical investigations in recent years. Only a few can be mentioned.

It is now fairly routine to provide Committees of the County Medical Societies with copies of records needed for clinical investigation of maternal deaths, infant deaths, late fetal deaths, deaths associated with anaesthesia, and deaths associated with cesarean section. It is also fairly routine to provide data regarding date and cause of death to institutions following up patients whom they have treated for cancer or other diseases. (22–29) Similarly, information regarding date and cause of death is provided to other agencies doing medical research, such as the American Cancer Society and the National Cancer Institute in their investigations of the influence of tobacco and other factors on cancer and other conditions. (30) Such assistance was also given to a study made by the Metropolitan Life Insurance Company of the experience of men disabled by heart disease. (31) In like fashion follow-up information has been provided for such investigations as the evaluation of thoracolumbar splanchnicectomy on mortality and survival in hypertensive cardiovascular disease and essential hypertension (32, 33) and another of the prognostic significance of the anoxemia test in coronary heart disease. (34) Examples of epidemiologic type studies that have been aided include those looking into amaurotic family idiocy; the occurrence of neoplasms, especially those of the lymphatic and hematopoietic systems, among children; differential mortality among physicians and dentists; variations in the number of births by day of the week, including their association with outstanding daily events.

With the decline in mortality from infectious diseases and

the increasing proportions of deaths among older persons, it has become obvious that the single cause of death concept produces data of minimum usefulness. Moreover, significant facts may be concealed by adherence to this concept. Consequently, the Department has been investigating methods of preparing multiple cause tabulations. Although methodological problems have been of primary concern, the data produced from a small sample have been otherwise useful. One study demonstrated that a more meaningful classification of deaths from cardiovascular disease than that provided in the International Statistical Classification could be designed if all the diagnostic information reported on death certificates were fully used. (35) This study will be followed by other investigations on classification of cardiovascular mortality. Another analysis of multiple cause tabulations, restricted to deaths among persons sixty-five years old and over, showed, for example, that 17 per cent of such persons had suffered a cerebrovascular accident in contrast to the nine per cent as indicated by "underlying cause of death" tables as routinely prepared. (36)

Although the discussion so far has related largely to vital statistics, the major portion of professional statistical time in the Department is now spent on other statistical problems of the Department. A few selected investigations, some completed, some in progress, must serve to demonstrate the scope of the program.

Other Public Health Statistics

Laboratory Problems. Question arose whether the laboratories of the Department of Health and the Department of Water Supply reached similar conclusions on coliform counts of potable water supplies. A comparative study of coliform findings on parallel water samples by both laboratories indicated that they were equally effective in determining coliform content. Such information is useful in the conduct of the sampling program of potable water by the Health Department, which acts as a control agency over the Department of Water Supply.

An earlier study of comparative laboratory findings for harbor waters revealed significant differences in bacteriologic results of the Departments of Health and Public Works. As a result, procedures in the laboratories were reviewed to determine the source of the difference. Again duplication of effort can be reduced if the reason for differences can be eliminated.

The usual method of checking laboratory performance has been by personal inspection. Analysis of frozen split samples of milk produced a direct and time-saving method whereby the milk bacteriology of several laboratories can be checked simultaneously without resorting to personal inspection. Design and method of analysis provide the means for evaluating the performance of the laboratories. (37)

In a study of certain blood constituents of newborn infants, it was observed by the statistician that untoward results occurred most frequently with mothers of blood type O when the blood of the infant is incompatible with that blood type; this was a significant hematological observation. (38) Isolation of the influential factors is now being attempted in a more detailed investigation.

A number of statistical studies were undertaken with the Bureau of Laboratories to evaluate new media proposed for standard plate counts of dairy products. As a result, new standard media was adopted. In the process of the evaluation a short and relatively simple method was designed for testing sample media or batches against standards. (39–41)

By statistical analysis of data already available it was possible to demonstrate to the satisfaction of the Bureau of Food and Drugs and the Bureau of Laboratories that four milk samples uniformly collected from each plant gave results as reliable as those of the six to ten samples routinely taken to determine average bacterial counts. The work in the laboratory was thereby reduced substantially without affecting efficiency.

Maternal and Child Health Problems. All children with cerebral palsy for whom financial assistance has been granted have been followed over several years. The data include type of

disease, financial payments, amount of hospitalization, and type of disability. Education of the child and degree of handicap is considered at three points in time: at the initial point when financial aid was first allowed, at the time when such financial aid ended, and the present situation. The purpose, of course, is to determine the extent to which the children were improved and how much it cost. (42)

In an evaluation of the reporting of birth injuries on the birth certificate, it was determined that there existed a considerable degree of both underreporting and overreporting. In other words, conditions noted at the time of delivery often turned out not to be birth injuries, while in many cases an actual birth injury was not manifested until after the birth certificate had been completed. (43, 44) As the result, serious consideration is being given to other methods of learning of birth injuries in order that the item may be eliminated from the birth certificate as not providing adequate information.

For all deaths under age 20 ascribed to congenital malformations, hospital and medical records relating to these young people were surveyed. The treatment and care are now being reviewed to determine whether the death could possibly have been prevented and whether the Department of Health, through its Bureau for Handicapped Children, could provide better service to children with congenital malformations.

A similar investigation was made of all deaths under age 20 ascribed to rheumatic fever and rheumatic heart disease. Its purpose was to determine the need for medical care of other members of the family and to evaluate the medical care that the decedent had received in order to see whether gaps in service exist. (45)

Mental health is the focus of a study of behavior problems (feeding, sleeping, etc.) encountered in children attending child health stations. This study will attempt to show the relationships, if any, between social and ethnic patterns and the type of problem encountered. The information obtained will be used as an aid in training the child health station physicians for

anticipatory instructions to parents. A companion study will look into such problems as seen in a group of children over a period of time. The purpose of this aspect of the investigation is to test the possibility of applying mental hygiene techniques into an ongoing program and will be conducted in cooperation with the Kips Bay Mental Hygiene Project.

Another study seeks the circumstances under which infants are withdrawn from the child health stations. Its purpose is mainly to determine the pattern of such withdrawals and the reasons, although some other pertinent information regarding the children leaving will be learned, such as the extent to which they have completed basic recommended immunizations.

Arrangements have been made in the department for nursing visits in all reported accidental poisonings among children under 16 years of age. A statistical program for compilation of data about such poisonings has been set up to cover the age of the patient, place and time of occurrence, the name of the poison, the signs and symptoms, the treatment and care given, preventable factors involved in the occurrence, and the outcome, as well as some questions on family background and home follow-up. Statistical analysis of the data compiled will hopefully provide information valuable in a preventive program directed toward poison hazards and also to confirm details of treatment given and the results. (46)

In view of the long term educational efforts that have been made to induce pregnant women to place themselves under medical care early in their pregnancies, the high proportion of women who do not receive adequate prenatal care in some areas of the City is disturbing. Plans have been prepared for a follow-back study, in one district of the City, of the prenatal supervision given to pregnant women in that district. This survey will serve incidentally to evaluate information regarding prenatal care given on vital statistics records. By interview of those women whose prenatal care was apparently inadequate, an attempt will furthermore be made to determine the reasons why they did not avail themselves of better care. It is expected

that this study will provide information useful for a program to improve the situation.

Communicable Diseases

Tuberculosis. In the mid-forties a punched card system was designed to provide measures of morbidity (prevalence and incidence) and mortality from the existing tuberculosis register. Information was thus made available in greater detail and with greater ease and accuracy than previously. The system since has been changed and adapted to meet new needs.

The introduction of antibacterial drugs for the treatment of tuberculosis led the Department to inaugurate ambulatory treatment of tuberculosis clinic patients by this new modality. A special statistical system was set up for evaluation of the results of such therapy. Identifying data and the characteristics of each patient at the start of treatment are recorded in such a manner that changes in his status can be readily determined at intervals. Reports have already been prepared on the outcome with respect to patients who have been treated in this program over a period of time. (47, 48)

The design for statistical analysis of the data from the South Bronx community-wide mass x-ray survey was planned by the Statistical Division of the Department in cooperation with its Bureau of Tuberculosis. In this instance the volume of tabulating work to be done indicated that this part of the job should be done on contact, outside of the Department, in order that the Department's tabulating facilities would not be overloaded and in order that reports could be planned for a specific interval after the close of the project. A novel part of this particular study will be the selection of several samples of the data in addition to the totals in order to demonstrate empirically, for the benefit of the administrators, the effectiveness of systematic samples of various sizes in this kind of an operation.

Another tuberculosis program requiring procedures for statistical evaluation is the tuberculosis screening program in the secondary schools. All students, upon admission, will be

screened for tuberculosis infection by means of patch tests. Positive reactors will be referred to the Department's tuberculosis clinics for follow-up chest x-rays each year during their school years. Negative reactors in selected schools will be given a new patch test each year, since it has been noted that the conversion rate in some areas of the City is high.

Social Hygiene. The Statistical Division is also responsible for reduction of detailed data no longer needed. An elaborate punched card system for reporting and controlling cases of, and contacts with, venereal disease was required fifteen years ago. With the growing use of penicillin therapy, such an extensive system was no longer necessary for control of clinic patients. This part of the system was therefore discontinued with due regard for continuation of morbidity reports, follow-up of contacts, and administrative needs.

Poliomyelitis. For a special study of the trend of the incidence of poliomyelitis tables were prepared showing mortality from this disease by age cohorts from 1916 to 1954. The purpose, obviously, is to measure the relative changes between each cohort after expiration of equal periods of time rather than to make the usual comparison between groups of similar age at different intervals of time. In addition, statistics are being routinely maintained on the attack rate among vaccinated and non-vaccinated children according to paralytic status for evaluation of the Salk vaccine administered in New York City. Analysis of the relationship between the site of a recent injection and site of paralysis in cases of poliomyelitis represents another one of the statistical studies in this field. (49)

Other Areas of Investigation

To determine the type of findings met in such a service, a plan was designed, integrated with the routine clinic recording, for the Cancer Prevention Detection Center. Again, the collection of these data was discontinued when the general patterns had been identified. (50) Only simplified counts of patients are now maintained for administrative purposes.

As with the cancer detection work, a temporary evaluative program to assess the results of the pilot diabetes detection clinic was installed. The data are now being analyzed and further collection halted, except for minimum administrative needs.

In cooperation with the Bureau of Nutrition an analysis of dietary factors among 100 underweight children selected in the Lower East Side clinic is in progress. Dietary histories of these children were recorded at annual intervals during which time the children were given nutritional education when they came for their monthly medical examinations. A report on the environmental factors relating to these 100 children has already been made (51), and the nutritional aspects are being evaluated.

The use and evaluation of data reported on certificates has already been mentioned. In 1955 the item on the birth and fetal death certificates relating to morbid conditions present during pregnancy was changed to follow the format inaugurated by the State of New York and recommended subsequently by the National Office of Vital Statistics. This format provides a check-off system in lieu of an open-ended question. It had been found in New York State that the check-off system yielded somewhat better results than the open-ended question. An evaluation study will determine the extent to which the reported information actually reflects the incidence of these specific conditions among the women delivered. At the same time, the data reported will be utilized to see whether measurable differences exist in the outcome of the pregnancies of women reported to have illnesses intercurrent with pregnancy as compared to those who do not.

Furthermore, a number of the bureaus in the Department have special interests in this particular project. For example, the Bureau of Tuberculosis will be interested in those pregnancies where tuberculosis was reported; the Bureau of Preventable Diseases will be interested in the influence of syphilis and viral infections on the outcome or pregnancy; the Bureau for Child Health will be interested in the influence of such condi-

tions as eclampsia, pre-eclampsia, hypertensive disease, pyelitis, and nephritis; while the Bureau of Adult Hygiene will be interested in the extent to which neoplasms or related conditions are reported and their influence on the outcome of pregnancy. All of these Bureaus have been asked to prepare study outlines so that the most widely useful information can be obtained from the records.

Plans have been made for statistical analysis of dental defects among a sample of school children. This survey is planned to provide baseline data against which may be measured the effects of fluoridation of New York City's water supply whenever such fluoridation is installed. Unfortunately, there is some question whether this survey can be undertaken at the present time since the Board of Education is reluctant to add to the surveys presently requiring cooperation of the schools.

Statistical assistance is also being furnished to a cooperative investigation with the Bureau of Preventable Diseases and several hospitals for a current study of the effectiveness of thymol turbidity as an indicator of hepatitis infectivity by way of blood transfusions.

The utilization of public health nursing time in schools was the subject of a survey to see whether nursing time is most effectively used. The kinds of activity required of the nurse were tabulated, as well as the average time and percentage of her total time spent in each activity. The influence of nonprofessional help (the public health assistant) on the expenditure of nursing time was also explored and consideration was given to the effect of special characteristics of particular schools and of the educational level of the schools or their auspices. (52)

General Morbidity Data. For a compilation of data about young people in New York City, the Department of Health was permitted to select a systematic sample of the medical records of enlistees and inductees rejected by the armed services during 1955. (53) Unfortunately a similar sample of all men examined could not be obtained to define the population specifically. Nevertheless, the fact that 294 per 1,000 are rejected,

182 for psychiatric, neurologic, or physical conditions, was considered useful information about general health status among these men.

A start in the direction of comprehensive morbidity information for the City has been made with the provision of budget funds for collection and analysis, on a routine basis, of data regarding patients discharged from municipal hospitals. This project has been discussed before this group by Dr. Fraenkel and me on two occasions. More recently the findings of our Pilot Project were published by Russell Sage Foundation. (54) The data presently collected are intended primarily to serve administrative needs of the Department of Hospitals, but expansion of the existing program in several directions is contemplated.

Tabulating Service

The availability of a fair sized tabulating division has made possible much of the work that is being done. But in addition to responsibility for application of mechanical tabulating techniques to statistical processes, the tabulating division is also being increasingly used to fill administrative needs. Data regarding tuberculosis cases for follow-up in districts can be obtained from the punch cards of tuberculosis cases registered with the Department, for example. Lists of births and fetal deaths are sent monthly to each reporting hospital so that they may check to determine that all deliveries occurring in the institution have been recorded. This listing also provides our Records Division with the major portion of an index by place of occurrence and thus has eliminated need for clerical staff formerly engaged in preparing such an index. In the last year also we were able to provide by means of our tabulating equipment the basic facts which have now been published in the form of new house number guides for health areas, published by the City Planning Commission after an interval of about twenty years since the first edition was published by the Welfare and Health Council. (55) Permits issued by the Department, as well as

notices to permit holders when the time comes for renewal of such permits, are now prepared mechanically. Considerable clerical time is thus also saved by the Department. A system for expediting and controlling the inspection of wholesale food establishments is now being constituted, utilizing the established source punch cards already available for permit purposes. This short "by-the-way" is inserted to illustrate how we serve the Department administratively as well as statistically and that the administrative service is sometimes a by-product of the statistical, involving little additional expense.

These brief descriptions of some of the completed, ongoing, and planned statistical studies should suffice to create a general impression of the scope of our interests and investigations. They effectively contrast with the limited vital statistics interests of 1866. However, the promise for our future was just as well phrased ninety years ago as it could be today. It was then said, "Defects and wants in this department of the sanitary service will continue to be discovered, while progressive experience and the constantly increasing intelligence and demands of society will both require and render practicable new and enlarged inquiries, registries, studies, and useful applications in Vital Statistics and Hygiene. Therefore the governing purpose in all which the Bureau has undertaken has been to recognize this necessity for progress in the development and direct application of Sanitary Science." (1)

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NEW FRONTIERS IN MEDICAL STATISTICS[1]

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INTRODUCTION

OUR health progress, since the beginnings of the public health movement and of advance in medical science, has been epitomized in a large body of mortality data and a very fragmentary body of morbidity data. Such data, however, are not merely to be admitted as records of accomplishment; they also have other functions, undoubtedly more important. Morbidity and mortality data enable us to detect new health problems, to plan programs for their control, to gauge the progress of these programs, and finally to measure the extent of their success. A typical example of such uses of morbidity and mortality data is furnished by the recent experience with the Salk vaccine for poliomyelitis. Examples of this kind are rather common among the infectious diseases, both the acute and the chronic, which are now very largely under control in our country.

Although we still have an important residue of health problems in the infectious diseases, attention has shifted rapidly to the chronic degenerative and wasting diseases typical of the older ages, but by no means entirely so. A few figures will indicate the importance of the age element in this shift. In 1900, only 22 per cent of all deaths were at ages 65 and over; this rose to 56 per cent by 1955, and may reach 62 per cent by 1975. In 1955, the cardiovascular-renal diseases and cancer jointly accounted for 70 per cent of the total deaths. Also prominent in our current mortality picture is fetal death and death in early infancy. The problem remains important because improvement at this stage of life has been very slow while our birth rate continues at a high level. These newly

[1] Based on a paper presented at the meeting of the Biostatistics Section of the New York Area Chapter of the American Statistical Association, May 10, 1956. This paper does not describe the widening area of application of mathematical statistics to medical and public health problems; this is surveyed by Bailey, N. T. J.: The Scope of Medical Statistics. *Applied Statistics*, November, 1952, 1, p. 149.

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emphasized problems of morbidity and mortality are difficult to us now not only because their causes are obscure in large degree but also because we believe, and most likely with good reason, that they arise from a complex of causes.

Determinants of Morbidity and Mortality

From a very broad viewpoint, the determinants of morbidity and mortality trends may be classified as follows (1):

1. *Scope, Quality, and Quantity of Health Services.* Research and invention in the medical and allied sciences has been stimulated in the postwar era by private and public funds. New immunizations prevent disease, new diagnostic techniques detect disease, and new therapies and surgical procedures extend impaired lifetimes. Older preventive and curative methods have also been improved. At the same time, medical care and public health facilities have become available to larger proportions of the country's people.
2. *Personnel in the Health Services.* The personnel in the medical, public health, and allied professions is now benefiting from improved training, the use of better tools and equipment, and better facilities for the exchange of ideas.
3. *Financing the Costs of Medical Care.* The rapid growth of voluntary health insurance plans in the United States in the postwar years has brought the advantages of a high quality of medical care within the reach of a large and growing proportion of the population.
4. *Consumers of Health Services.* With health insurance coverage widely held, many can now give early attention to their illnesses. In addition, health education and publicity given to medical advances have made the population more health-conscious.
5. *Economic Progress.* Contributions to health progress have also come from the economic progress which has brought a higher standard of living with more abundant, better, and more varied food, with a healthier work and home environment, and with time for healthful recreation.

At this point, it can only be generalized that, in each of these

five categories there are elements susceptible to measurement that may help our understanding of morbidity and mortality characteristics and trends. Important in this connection is the need for indices for measuring the level of health which takes into account not only morbidity and mortality, but also other factors in the wellbeing of individuals in the community, such as nutrition and mental state (2).

Needed Mortality and Morbidity Data

Some specific needs in mortality and morbidity statistics can be cited (3). In the area of mortality statistics, we need first of all an insight into the variations in the quality of cause of death data among the States and even within them. Those of us who have had occasion to study such data have found some very puzzling differences between neighboring States, particularly in the case of the cardiovascular diseases.

We know very little about socio-economic variations in mortality in this country. Some work now in progress in the National Office of Vital Statistics is based upon data for groups of occupations which may represent a social-economic stratification (4). However, within each such group, there may be significant variations according to the educational attainment of the family heads, family income, family size, and many other factors.

Our present system of vital statistics cannot provide the basic data for studies of this kind. However, there are such possibilities in the suggestion that there be established sampling areas in which the facts on the cause of death certificates would be supplemented by further data gathered from the family, the attending physician, and the hospital or clinic. Any social, medical, or genetic information from such sources should be fruitful in the study of perinatal mortality and the chronic degenerative and wasting diseases (5).

Particularly with regard to the latter, we have not yet taken full advantage of the information on the present death certificate by intensive studies of multiple causes. Useful demon-

strations of multiple cause tabulations have been made by the New York City Department of Health (6) and the Illinois State Department of Health. These directions in the study of mortality—that is, multiple cause tabulations and data supplemental to the death certificate—lead naturally into the area of morbidity statistics.

Morbidity data of varying scope and quality have come to us from many sources. A common approach for the collection of morbidity data for the general population is through the single visit or periodic visit survey. Unfortunately, there has been no systematic pattern in the conduct of such surveys so that no means for ascertaining variations in morbidity characteristics and trends throughout the country is on hand. However, a very bright ray of hope appeared in the recommendation for periodic and special health surveys contained in the President's health message to the Congress in January 1956. This proposal was enacted into law in July of the same year. The opportunities for the development of morbidity data will depend, of course, upon the resources put into this program. There will also be many problems and perhaps among the most important will be that of the quality of the causes of morbidity reported. The issue was made quite clear in a paper by Dr. Trussell and his colleagues on some results of the Hunterdon County survey (7). The frequency distributions of specific morbid conditions for the same persons were found to be different when reported by a family member, when reported by physicians who were informed of the diagnoses as given by the patients, when reported by physicians not so informed, and when found by clinical evaluation.

Since the chronic illnesses are usually of vague origin and long duration, the usual type of single or periodic visit survey can hardly provide an adequate picture of antecedent circumstances or of long-term medical care. The new approach for information in this area has been through the longitudinal or cohort type of study. Most of such studies begin with a body of lives with some specific morbid condition and trace them

forward for a period of years during which a record is kept of their morbidity and mortality. Examples are found in the follow-up studies of cancer patients. A step forward was taken in the Framingham study, scheduled to last twenty years, in which a sample of presumably healthy individuals are to be observed at frequent intervals for the onset of heart disease (8). The observations for these individuals will be correlated with their background data and medical care data. Worth noting at this point are the data regarding the incidence of morbid conditions among presumably healthy groups that may emerge from screening surveys using rapid diagnostic techniques (9).

Medical Care Data

The proportions of the population requiring various forms of medical care may increase not only because of the aging of the population but also because advances in medicine are prolonging the lifetime of those with physical impairments. Unsolved problems and needs in the area of medical care statistics have been pointed out in a report of a joint committee of the Medical Care and Statistics Sections of the American Public Health Association presented at the Annual Meeting in November 1953. Problems lie not only in measuring medical care needs and demands for services in the community, but also in measuring the volume and quality of services available and of services rendered. The distinctions between the needs and demands for medical care services, and between services available and rendered may easily be overlooked. Flowing from these issues are questions with regard to terminology, the standard and content of medical care services, and the units by which to measure these services.

Without commonly accepted definitions and uniform standards of classification, measurement, and tabulation practices, a community can hardly gauge and plan to meet its medical care problems and to study the trends in these problems. Comparisons among communities become impossible. The difficulties become evident in studies of the great variety of medical

care programs for the indigent in this country in which services are rendered by voluntary and governmental agencies at the local and State levels (10). A community may know how many general assistance and public assistance cases it has on its rolls but it may not know how many are in receipt of medical care because one person or family may use a number of facilities. Difficulties of measurement are also apparent in efforts to compare the services available and rendered by the great number and variety of private medical care plans set up in recent years for the self-supporting (11).

Social Research Related to Health

Historically, the public health movement had its roots in the social problems arising out of the Industrial Revolution. At no time has sight been lost of the bearing that social and economic influences in the environment may have upon health and disease and, as with everything else, concepts in this area are becoming more penetrating. Ever since the social observations which led John Snow to his classic discovery of the spread of cholera in a London area through a faulty water pump, problems of environment in relation to health have continued (12). Today, a leading question is that of the incidence of cancer of the lungs in relation to smoking habits and also to air pollution in the community (13). The problem of cholera a century ago was perhaps no less obscure then than that of cancer of the lung currently; in both, the role of statistical observation has earned its place.

Local surveys of morbidity have established a few demographic, social, and economic factors related to the prevailing state of health (14). Thus, it is known that the prevalence of illness, whether disabling or not, advances with age after adolescence; that the illness rates are higher for women than for men, contrary to the situation in mortality; that the rates are higher in the less favored occupation classes; that they are higher for the unemployed than the employed, perhaps because the very ill lose employed status; and that housewives

have an illness record with higher rates than women at work.

The search now is for more fundamental social and economic factors bearing upon the state of health and medical care. For example, it has been observed that, in many countries of Western Europe and English-speaking countries elsewhere, mortality from the cardiovascular-renal diseases has been rising among males at ages 45–64 years, but falling at other ages for males and at all ages for females (15). There is no evident explanation for this anomaly; however, it has been suggested that this trend among middle-aged males may reflect a rise in the stresses and strains of modern economic life. The situation leads to an area of research in which social and other stresses are related to the onset and course of disease; statistical studies may offer significant clues in this area as they have in others.

Many other facets of social problems in relation to health are being studied statistically at the present time (16). These are concerned principally with attitudes, motivations, and relationships, between persons, groups, and within groups. For example, data for a report published by the Health Information Foundation on public attitudes toward prescription costs and the drug industry were gathered from a representative sample of the general population (17). Another sampling survey supported by the Health Information Foundation is concerned with a multiplicity of factors bearing upon the utilization of health facilities and services by the general population. A survey in three cities sought answers to the question why some persons appear for diagnostic x-ray screening while others do not (18). From a random sample of physicians, the American Medical Association obtained statements of attitude toward voluntary health insurance (19). Other examples deal with patient-doctor relationships and with attitudes toward medical care (20). In a more general way, a committee of the Social Science Research Council is exploring the possibilities for studies of the relationships between preventive medicine and social science research (21).

Medical Economics

Any student of medical economics is soon impressed by the complexities in trying to measure how much of our productive resources enter into health programs and medical care, both public and private. The difficulties arise not only from a lack of adequate data, but also from the extent to which these resources are intermeshed with the many facets of our production. It may perhaps help to visualize the scope of our public health and medical care facilities if its volume were represented by a box into the top of which were led a series of pipes to deposit the resources put into it from the many sources, and out the bottom of which were led another series of pipes corresponding to the various services rendered.

A very large out-flow would show the specific medical care services purchased by personal consumers. Such data are published annually in the Social Security Bulletin (22). These data may suffice for national accounting purposes, but they represent an awkward conglomeration for a close study of our medical care bill and our plans to meet it. Included in these data, but without distinction, are such items as aspirin, water bottles, physicians' services for very minor illness, and also the services involved in costly major illness. Lumping of such figures can hardly provide a basis for comparison with the medical care costs covered by voluntary health insurance, as is done in the reports published in the Social Security Bulletin.

The situation shows a need for data regarding individual and family expenditures for medical care to provide detail distributed according to such items as family income, occupation of family head, place of residence, the number of family members and their sex and ages, the specific illnesses experienced and their duration, and the medical charges incurred according to services rendered (23). Cross-classification in such detail requires a large body of data. Also, because costly illnesses are usually of long duration, a lengthy period of observation may be required. This aspect of medical care economics would

be filled out if unit charge data were available from providers of specific services.

Conclusion

The maintenance and promotion of health has become a major industry in this country and the outlook is that it will continue to grow. As with other industries that plan production for a contemplated market, the health industry will require a substantial body of pertinent data encompassing its many ramifications.

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SOCIO-ECONOMIC STATUS, ILLNESS, AND THE USE OF MEDICAL SERVICES[1]

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A SURVEY of past studies on the subject with which this paper deals generally reveals that the greatest amount of illness is found amongst those socio-economic classes which are least able to pay for it. The work of Sydenstricker in Hagerstown, Maryland as early as 1921 revealed an increase in illness with a decrease in socio-economic status (1). Despite differences in definitions of illness and socio-economic status, most of the subsequent studies had findings consistent with those in Hagerstown. They further discovered that the lower socio-economic classes, those with the greatest proportion ill, consulted physicians and were hospitalized least (2). One important exception, the study by the Committee on the Costs of Medical Care, suggested that persons in upper strata had highest illness rates, but concurred with other investigations in finding that lower strata use physicians and hospitals least (3).

The purpose of this paper is to examine the relationship of socio-economic status, illness, and use of physicians and hospitals in Butler County, Pennsylvania in 1954. In the last fifteen years, America has seen continuing and increasing economic prosperity. Concurrently, it has witnessed a growth in the use of health insurance and increasing control of communicable diseases. It seems particularly important at this time, therefore, that the relationship between social stratification and health be re-examined to discover whether the traditional picture has changed in response to new conditions.

The data utilized in this investigation were gathered in June and July of 1954 by personal interviews on a probability

[1] Paper presented at the Medical Sociology section, meetings of the American Sociological Society, Detroit, Michigan, September 7, 1956.

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sample developed through the area sampling technique, combined with geographic stratification and proportionate representation of urban, rural-place, and open country population.[3] The sample, consisting of 3,403 persons, represented roughly three per cent of the County's population, all of the white race. Butler County, it was found, is about 28 per cent urban, 20 per cent rural-place and 52 per cent open country population. Two kinds of evidence can be used to evaluate the estimates developed in this survey. First, comparisons of the survey results with those of the 1950 census, show close similarities in estimates on age, sex, education, and rural-urban distributions. Secondly, computations of sampling variation of estimates based on the survey indicate a relatively small margin of error.

The Findings

Using Edwards' Occupational Categories to establish socio-economic status, six classes were devised: professionals in class A, proprietors and managers in class B, clerks and sales personnel in class C, skilled in class D, semi-skilled in class E, un-skilled in class F. The 236 farmers in the sample were excluded from this analysis. The definitions of illness and of use of services must be carefully grasped. Respondents were first queried as to whether they or any members of their households had at the time of interview any of nine chronic diseases, rheumatic fever, high blood pressure, diabetes, asthma, kidney trouble, arteriosclerosis, or hernia. Later they were asked whether anyone in their households had consulted a physician, had been hospitalized, or had lost time from work or other usual activity in the month prior to interview. Questions were also asked to determine hospitalization in the year prior to survey. In each case of an affirmative answer, ques-

[3] Sampling procedures were established by Donovan J. Thompson, Ph.D., Department of Biostatistics, Graduate School of Public Health, University of Pittsburgh. The advice and encouragement of Antonio Ciocco, Sc.D., Head of that Department, throughout the course of planning and execution of the project and in the analysis of data were invaluable, and grateful thanks are hereby tendered. Discussions with Professor A. B. Hollingshead, Ph.D., Department of Sociology, Yale University, have also been of material aid.

	Classes						Total	X^2 Probability
	High			Low				
	A	B	C	D	E	F		
Total Persons Ill	40	69	66	205	179	176	735	.75
Percentage (Age-Adjusted)	25.3	22.8	24.2	25.3	23.3	25.5		
N	163	294	270	843	809	686	3,065	
Ill Persons Consulting Physicians in the Month Prior to Survey	23	23	30	93	69	74	312	.15
Percentage (Age-Adjusted)	58.3	34.5	40.4	43.8	36.6	40.6		
N	40	69	66	205	179	176	735	

Table 1. Ill persons and ill persons consulting physicians in the month prior to survey, in percentages (age-adjusted).

tions were asked as to whether a medical condition had been responsible, and if so, further questioning was undertaken to discover the nature of the medical condition. A final question had to do with whether any individual had been ill but had not seen a doctor, been hospitalized, or lost time from work. A count of the total number of people who affirmatively answered any of the questions and cited medical conditions as being responsible, furnished an estimate of the total illness in Butler County. Our analyses are in terms of numbers of people ill rather than in terms of attacks of illness.

It was found that no discernible differences existed among the classes in the total percentage of persons ill of any cause during the month preceding survey. Because of variations in age distribution of the classes, and of the importance of age in illness, proportions are age-adjusted. Class A reported 25 per cent ill, as did class F. (*See* Table 1) This is at odds with traditional findings. In the proportions consulting with physicians regarding their illnesses, however, some differences were discovered. Fifty-eight per cent of class A individuals consulted with physicians and this decreased to around 40 per cent of class F.

Dividing illnesses into acute and chronic conditions, we find only small differences. (*See* Table 2) Class A had the highest proportion of acutely ill individuals with 13.3 per cent. Class

	Classes						Total	X^2 Probability
	High			Low				
	A	B	C	D	E	F		
Persons with Acute Illness	19	23	28	79	59	68	276	.25
Percentage (Age-Adjusted)	13.3	8.1	10.3	9.4	7.3	9.8		
N	163	294	270	843	809	686	3,065	
Acutely Ill Consulting Physicians	17	14	23	64	45	46	209	.15
Percentage (Age-Adjusted)	87.0	50.0	63.3	78.8	74.8	70.6		
N	19	23	28	79	59	68	276	

Table 2. Persons having acute illness and acutely ill persons consulting physicians in the month prior to survey, in percentages (age-adjusted).

F, however, had a somewhat smaller proportion with 9.8 per cent. This increase of acute illness with increase in class rank is at odds with the inverse relationship discovered in the National Health Survey (4). But the differences observed in Butler were not significant by the chi-square test.[4] With

[4] The diseases were classified after examination of the categories into which they fell in the *Manual of the International Statistical Classification of Disease, Injuries, and Causes of Death*, World Health Organization, 1948. The diseases were classified as follows:

Acute:
Infective and Parasitic: 002–019, 48–102.
Diseases of the Nervous System and Sense Organs: 331–332, 370–379, 388–394.
Diseases of the Circulatory System: 400–401, 434, 456, 463–468.
Diseases of the Respiratory System: 463–501, 511, 517–519.
Diseases of the Digestive System: 533–539, 543–544, 550–551, 570–571, 575–576, 578–580, 583, 586–587.
Diseases of the Genito-Urinary System: 590–593, 600, 605, 606, 610, 621, 624, 630.
Deliveries and Complications of Pregnancy, Childbirth and the Puerperium: 650–689.
Diseases of the Skin and Cellular Tissues: 690–695, 698, 703, 714, 716.
Diseases of the Bones and Organs of Movement: 722, 727, 730, 735, 738–741.
Diseases of Early Infancy: 761.
Symptoms, Senility and Ill-Defined Conditions: 780, 783–789.
All Accidents, Poisonings, Violence.

Chronic:
Infective and Parasitic: 130–138.
Neo-plasms: 130–239.
Allergic, Endocrine System, Metabolic, and Nutritional Diseases: 240–296.
Diseases of the Nervous System and Sense Organs: 334, 350–369, 385, 396–398.
Diseases of the Circulatory System: 416–420, 443–455, 460–462.
Diseases of the Respiratory System: 502–510, 512–516, 522–526.
Diseases of the Digestive System: 540–541, 545, 552–560, 572–573, 581, 584.
Diseases of the Genito-Urinary System: 594, 602–603, 612, 620, 633–637.

(Continued on page 62)

	Classes						Total	X^2 Probability
	High			Low				
	A	B	C	D	E	F		
Persons with Chronic Illness	22	50	45	145	136	130	528	.60
Percentage (Age-Adjusted)	12.7	15.8	16.5	17.7	18.1	19.0		
N	163	294	270	843	809	686	3,065	
Chronically Ill Persons Consulting Physicians	17		36		52		105	.75
Percentage (Age-Adjusted)	22.4		18.8		18.6			
N	72		190		266		528	

Table 3. Persons having chronic illness and chronic ill persons consulting physicians in month prior to survey, in percentages (age-adjusted).

regard to acutely ill persons who consulted physicians relative to their illness, however, the traditional pattern was suggested. Thus, almost 90 per cent of class A persons who were acutely ill saw their doctors, only half of class B, and around 70 per cent in class F consulted their physicians. But although class F consulted less than class A, no regular decline from one to the other was observed, nor were differences statistically significant.

Persons having chronic disease were defined by considering those who answered affirmatively to the specific questions regarding whether household members had certain chronic diseases; also included were persons who reported an acute attack of a chronic disease in the month prior to survey.

Only insignificant differences in persons having chronic diseases amongst the classes were discovered. (*See* Table 3) Thirteen per cent of class A were afflicted with chronic diseases in the month prior to survey as opposed to 19 per cent of class F. Thus, the traditional picture was again discovered. The number of persons consulting physicians for their chronic illness was very small, and estimates, therefore, are less reliable than in the cases already cited. Nevertheless, it was found that

Diseases of the Skin and Cellular Tissue: 696, 701–702, 708–713.
Diseases of the Bones and Organs of Movement: 725–726, 732, 734, 737, 744–749.
Congenital Malformations: 750–757.
Symptoms, Senility and Ill-Defined Conditions: 782, 790–791, 794.

	Classes						Total	X^2 Probability
	High			Low				
	A	B	C	D	E	F		
Persons Having Impairments	25		57		69		151	.75
Percentage (Age-Adjusted)	5.1		6.1		4.9			
N	457		1,113		1,495		3,065	

Table 4. Persons having impairments, in percentages (age-adjusted).

around 22 per cent of classes A and B consulted their physicians as compared with around 19 per cent of classes C, D, E, and F.

With regard to reporting of impairments such as loss of arms or legs and vision or hearing defects, the upper, middle and lower classes were almost identical. (*See* Table 4). Roughly 5 per cent in all classes reported an impairment.

Analyses of the use of health services among the classes revealed other differences which were small. (*See* Table 5). Thus the proportion of persons who saw a doctor for any reason, i.e., consultation for illness or for routine physical examinations was 18 per cent of Class A as compared to 13 per cent of class F. We have already seen that in consultation for illness, there was a small decline with class rank. An almost infinitesimal

Table 5. Persons consulting physicians in month prior to survey, and persons hospitalized in year prior to survey by percentages (age-adjusted).

	Classes						Total	X^2 Probability
	High			Low				
	A	B	C	D	E	F		
Persons Consulting Physicians for Any Reason	28	37	37	109	94	87	392	.60
Percentage (Age-Adjusted)	17.5	12.5	13.6	13.0	12.1	12.5		
N	163	294	270	843	809	686	3,065	
Persons Consulting Physicians for Examination	15		21		40		76	.15
Percentage (Age-Adjusted)	3.0		1.9		2.7			
N	457		1,113		1,495		3,065	

	Classes						Total	X^2 Probability
	High			Low				
	A	B	C	D	E	F		
Persons Hospitalized in Past Year	13	16	20	56	43	44	192	.60
Percentage (Age-Adjusted)	7.8	5.2	7.2	6.8	5.5	6.5		
N	163	294	270	843	809	686	3,065	

Table 6. Persons hospitalized in past year by percentage (age-adjusted).

decline with rank also was recorded in proportions consulting physicians for examinations. The differences, of course, were not statistically significant.

Again, in the use of another type of health service, hospitals, no significant differences were revealed. Roughly 8 per cent of class A persons were hospitalized in the year preceding survey as compared to around 7 per cent of class F persons. (*See* Table 6). It was felt that the effect of possession of health insurance might have some influence on the use of hospitals by individuals in Butler County. Analysis revealed, however, that persons with health insurance are not much more likely to have been hospitalized than those without it.

We can conclude that when the variables are defined as they were in Butler County in 1954, the relationship of socio-economic status to illness differs in some degree from that found in past studies. Only minor differences were discovered in illness rates and in use of hospitals. The only relationships similar to those found earlier were in the slightly smaller use of physicians and the somewhat larger proportion of persons with chronic disease in the lower part of the socio-economic continuum. It is true that definitions of socio-economic status and of illness differ in the various studies. Some are based on income, others on categories such as "well-to-do" and "comfortable," and others, like the present study, on occupation. Nevertheless, the definitions are roughly similar. In view of the findings of the present study, then, we suggest that the whole problem of the relationship between socio-economic

status, illness, and use of services should be re-examined in future studies.

It is possible that socio-economic differences in illness as defined in this paper never existed in Butler County, or that if they did in the past, as intimated by earlier studies, they have disappeared. If the latter alternative is the case, and this possibility exists, they may have disappeared because of the prosperity America has enjoyed in the last fifteen years, because of the proliferation of health insurance, and because of the increasing control of those illnesses which are fostered by low socio-economic status.

Increasing prosperity could make more universally available the material prerequisites for health, i.e., good food, housing, and the like, and thus help to reduce class differences in illness. Again, the greatest advances of medical science and public health have been in the direction of controlling communicable diseases. These are the diseases which are fostered by the crowding, filth, and other factors associated with low socio-economic status. The new control measures may be so effective that disease is reduced regardless of illness-producing conditions in some classes, and class differences in illness thus are reduced. Finally, the spread of health insurance protects all classes from the costs of illness, and this may promote the use of hospitals in equal degree by all classes. The possibility that the lower classes still consult physicians less may be a reflection of the less effective insurance provided for the costs of physicians' services.

All of these are suppositions only. We have no evidence that Butler County is peculiar in its conditions because of any change. The situation revealed may be a long-standing one. It is interesting, however, that Butler County does not appear to be aberrant from others in Pennsylvania in education, housing characteristics, or in medical care facilities. A study comparing the illness and use of medical care facilities in Butler County and the Arsenal Health District of Pittsburgh revealed no important differences between the two areas (5). The one

unequivocal statement that may be made is that in Butler County, while some traditional relationships were suggested, no appreciable differences, as we defined them, existed among socio-economic status groups in illness and use of hospitals. This indicates the need for further examinations of the relationship.

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ATTITUDES OF FEMALES TOWARD FAMILY PLANNING IN A MAHARASHTRIAN VILLAGE

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THIS paper[2] reports part of a study of family planning attitudes and practices,[3] made in Badlapur Village, Bombay State, India, during 1954. In this report[4] only those factors are delineated which were associated with the expressed willingness of the married women of the village to limit size of family and to use birth control techniques to achieve that end.

Badlapur, a Maharashtrian Konkan village,[5] has a population of approximately 3,200 persons, comprising forty-five caste groups, who also represent the Hindu, Muslim, Christian, and Jain religions. The principal crop of the area[6] is rice, which is grown during the monsoon period when an average rainfall

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[4] Morrison, William A.: Attitudes of Males Toward Family Planning in a Western Indian Village. The Milbank Memorial Fund *Quarterly*, July 1956, xxxiv, No. 3, pp. 262–286, for a study of the attitudes of the married males of Badlapur on this subject. Both the males and females interviewed for these two studies came from the village of Badlapur. The men of the male sample are not necessarily the husbands of the women of the female sample, although there are some husband-wife combinations in the two samples.

[5] Maharashtra is the cultural-linguistic area of Western India in which Marathi is spoken. The Konkan is the geographical region lying between the Indian Ocean and the Sahyadries or Western Ghats in Maharashtra.

[6] The area, consisting of the two administrative districts of Thana and Kolaba, is still predominantly agricultural, for approximately two-thirds of the persons in the area are dependent upon agriculture for a livelihood.

of over one hundred inches comes within the short period of three and one-half months.

The Female Sample

Two women interviewers[7] were instructed to interview married women who considered themselves to be of the child-bearing age. If the subject indicated strong unwillingness to discuss the matter, the interviewers did not persist. The great majority of the village women had not discussed this matter before, not even with their spouses. The interviewers did have great difficulty in contacting two caste groups, the outcastes or Harijans and the tribals.[8] The women of these castes, who are very poor in general, work as house servants, as day laborers, and at other menial tasks to secure funds for their daily sustenance. In addition the tribal women are not to be found in the village for weeks at a time, for they go with their families into the jungle on seasonal work. Because of these factors, the Harijan-Tribal group is not represented in the universe population under discussion, a universe which consists of married females, 15–44 years of age, of Badlapur, exclusive of these two lower caste groups.

The sample population, 126 married females 15–44 years of age, constitutes 25.5 per cent of the universe population, 494 females. The degree of correspondence of the sample and the universe populations with respect to the four variables of caste, age, occupation, and education are presented in Table 1. The

[7] The author is indebted to Miss Chandrakala Orpe and Miss Suman Orpe who were the interviewers on this project. Both young ladies were residents of the Badlapur area and knew many of the village women. Without their great persistence and interest this study could not have been made, for many women in the village did not at first understand the study's objectives, which had to be patiently and clearly explained to each interviewee. The author is also indebted to Mr. Hari C. Bhagwat, Mr. Manavant N. Ghatwal, Mr. Sakharam D. Thasal, Mr. Vinayak P. Marathe, Mr. Madhukar G. Gandre, and Mr. Manohar G. Orpe who translated the original material from Marathi into English, and to Judge Narayan G. Chapekar, retired, of Badlapur, who opened his home to the author when he came to Badlapur. Without the guidance, counsel, and friendship of Judge Chapekar and his son, Dr. Lakshman N. Chapekar, the author's work in Badlapur could not have been accomplished.

[8] The three castes of Harijans, or Outcastes, Mahar, Chambhar and Bhangi, and the two tribal castes, Thakur and Katkari, were very difficult to contact. Rather than to expend valuable time in a seemingly fruitless effort to establish rapport, it was decided to exclude them from the sample.

Variable	Chi Square	Degrees of Freedom	P Value
Caste	1.2347	2	55.1
Age	2.3460	2	31.6
Occupation	12.0733	6	6.1
Education	46.3322	2	nil.

Table 1. Correspondence of the sample with the universe population in terms of several variables indicated by the chi square test of goodness of fit.

degree of correspondence between the sample and the universe distributions are shown by the values of P. With respect to caste and age the P value is high and is moderate with respect to occupation. The educational status of the sample is uniformly better than that of the universe, for 46.8 per cent of the sample and 70.6 per cent of the universe population were illiterate. This is the major difference between the sample and the universe. In all other respects, the moderate to high values of P here indicate that the sample does mirror the universe population, that it is representative.

Desire for Offspring

In this section several demographic and socio-cultural variables which can be assumed to be associated with desire for offspring are tested for their statistical significance of association with the attitude toward family planning. In reply to the question: "Do you wish to have more children?", forty-eight women, 38.1 per cent of the sample population of 126 females, answered "no." Although these women seemingly constitute a small group numerically, they are almost four out of ten of the sample population. They possess several important characteristics significantly differentiating them from the remaining women of the sample.

The data presented in Table 2 show that a direct relationship exists between age and desire for no additional offspring. The women aged 35–44 are almost unanimous in their attitude, with 92.9 per cent wanting no additional progeny, compared with 7.7 per cent of those 15–24 years of age who held a similar

Age Group	Total	Desire More Offspring	Desire No More Offspring	Per Cent Desire No More of Total
Total	126	78	48	38.1
15–24	39	36	3	7.7
25–34	59	40	19	32.2
35–44	28	2	26	92.9
Chi Square 51.7499			Chi Square Probability Nil	

Table 2. The sample population by age and by desire for additional offspring.

opinion. The unanimity of thought and desire on the part of the married village women over 35 years of age on this subject negates the often stated "truism" that the "silent, suffering" village women willingly bear as many children as fate should decree. That appears not to be true.

The association between number of total offspring, including living and dead progeny, and desire for no additional offspring also proved to be statistically significant. A direct relationship exists, as Table 3 indicates, for 10.5 per cent of those with 1–2 total offspring and 78.6 per cent of those with 7–13 total offspring desired no additional progeny. The critical level for change in attitude from desire to no desire appears to be the five total offspring level, for 58.5 per cent of that group were not desirous of additional progeny. The great majority of those with less than five total offspring desired more while those with five or more desired no additional children.

Table 3. The sample population by number of total offspring and by desire for additional children.

Number of Total Offspring	Total	Desire More Offspring	Desire No More Offspring	Per Cent Desire No More of Total
Total	126	78	48	38.1
1–2	38	34	4	10.5
3–4	33	28	5	15.2
5	17	7	10	58.2
6	10	3	7	70.0
7–13	28	6	22	78.6
Chi Square 46.4656			Chi Square Probability Nil	

Number of Living Offspring	Total	Desire More Offspring	Desire No More Offspring	Per Cent Desire No More of Total
Total	126	78	48	38.1
0–2	54	47	7	13.0
3	24	17	7	29.2
4	15	6	9	60.0
5	12	3	9	75.0
6–11	21	5	16	76.2
Chi Square 38.1691			Chi Square Probability Nil	

Table 4. The sample population by number of living children and by desire for additional offspring.

To investigate further the importance which number of progeny plays as a factor associated with this attitude, associations between number of living offspring as well as between number of living male offspring[9] and desire for additional offspring were computed. The data are presented in Tables 4 and 5. In each case a direct relationship was found to exist. An important generalization emerges from a comparison of Tables 3, 4 and 5.

Table 5. The sample population by number of living male children and by desire for additional offspring.

Number of Living Male Offspring	Total	Desire More Offspring	Desire No More Offspring	Per Cent Desire No More of Total
Total	126	78	48	38.1
0	24	21	3	12.5
1	48	35	13	27.1
2	30	16	14	46.7
3–7	24	6	18	75.0
Chi Square 23.9204			Chi Square Probability $< .001$	

[9] The desire for male progeny in the Hindu is very strong. A son is absolutely essential if the traditional-orthodox obsequies are to be performed. The Shastras, sacred religious literature, stress the importance of male progeny. In the Laws of Manu, it is written:

"28. By the study of the Veda, by vows, by burnt oblations, by (the recitation of) sacred texts, by the (acquisition of the) threefold sacred science, by offering (to the gods, Rishis, and manes), by (the procreation of) sons, by the great sacrifices, and by (Srauta) rites this (human) body is made fit for (union with) Brahman." 11, 28.

Buhler, G. translator: The Laws of Manu, Oxford: Clarendon Press, 1886, 11, 28, p. 34.

Number of Years Married	Total	Desire More Offspring	Desire No More Offspring	Per Cent Desire No More of Total
Total	126	78	48	38.1
0–10	41	36	5	12.2
10–14	29	20	9	31.0
15–19	17	9	8	47.1
20–24	10	3	7	70.0
25 and Over	29	10	19	65.5
Chi Square 26.4099			Chi Square Probability <.001	

Table 6. The sample population by number of years married and by desire for additional offspring.

The number of progeny born by a majority of the women who desire no additional offspring is successively reduced from five total offspring to four living offspring to three living male offspring. In other words, as the tabular data illustrate, a majority of the women of the sample who possess these number of offspring desire no additional progeny. Even though these three associations may measure much the same thing statistically,[10] the lowering of the critical level at which desire for more offspring becomes desire for no additional offspring in each association is very important.

The traditional cultural veneration and acceptance of the large family ideal clearly is not operative[11] in the group studied. Satisfaction with three male progeny or four living progeny indicates a small family norm held by these village women and a definitely non-passive attitude concerning additional offspring.

[10] The author is now engaged in treating the data with multiple variable techniques to ascertain the validity of the hypothesis that these variables may be measuring to some degree the same thing. However it is felt that the insights provided by the use of the present technique are enough to warrant their presentation at this time.

[11] Several sources delve into the traditional ideal patterns at length. Apte, V. M.: Social and Religious Life in the Grihya Sutras. Bombay, Popular Book Depot, 1954, pp. 46–8 describes the preference for sons and the desire for large family in the Rig Vedic period; Srinvas, M. N.: Marriage and Family in Mysore. Bombay, New Book Company, 1942. Chapter xv "Desire For Children" also stresses the orthodox abhorence of childlessness and the longing for children, pp. 171–6; Meyer, Johann: Sexual Life in Ancient India. New York, Barnes and Noble, 1953, pp. 151–3 illustrates from the ancient texts the absolute necessity of marriage and progeny, particularly male.

Caste Group	Total	Desire More Offspring	Desire No More Offspring	Per Cent Desire No More of Total
Total	126	78	48	38.1
Professional and Trading	64	32	32	50.0
All Others	62	46	16	25.8
Chi Square 7.8163			Chi Square Probability .005	

Table 7. The sample population by caste and by desire for additional offspring.

Number of years married, as a variable, was also statistically significant in its association with desire for additional progeny, Table 6. A majority of women married twenty years and more desired no additional children, while those married less than twenty years were of the opposite opinion in the majority of cases. Actually, only 12.1 per cent of those married less than ten years desired no additional children, but 65.5 per cent married 25 years or over were so inclined.

Caste serves as a general indicator of socio-economic status in the village. To know a woman's caste is to know generally her husband's occupation, and the level and standard of living of her family.[12] When caste, considered as a variable, was tested for its association with desire for additional offspring, it was found to be statistically significant too, as Table 7 indicates. One-half of the women of the professional and trading castes, which constitute the middle and upper class castes of the village, desired no additional offspring, while only one-quarter of the remainder were of that opinion. Caste, the variable least significant statistically in its association, reflects the differences between the more non-traditional milieu of the professional and trading castes as compared with the more traditional orthodox milieu of the agriculturalists.[13]

[12] Within the village, caste does serve as an approximate determinator of socio-economic position. The author is engaged in the development of socio-economic index which will serve to indicate class—caste correlation.

[13] Traditional orthodox milieu is here defined as the more rigid adherence to the cultural norms of village Hinduism, as well as less contact with and interaction in

(Continued on page 74)

Variable	Chi Square	Degrees of Freedom	P Value
Education	.9100	3	Greater than 80.0
Age at Marriage	1.0537	3	79.0
Occupation	6.3435	4	18.0

Table 8. Summary tables for those variables found not to be significantly associated with the desire for additional offspring by the chi square test of goodness of fit.

Three other variables proved not to be statistically significant in their association with the desire for additional offspring. They were education, age at marriage, and occupation of husband. As the data of Table 8 indicate, the level of probability associated with these indices is much higher than that customarily accepted as statistically significant.

In summary, the indices shown to be statistically significant reflect a strong and important sentiment among the village women for a limited number of offspring. Whether this sentiment is or is not a component element in a non-traditional value orientation will be investigated at a later point. First the indices significantly associated statistically with attitudes toward the use of contraceptives must be analysed.

Attitude Toward the Use of Contraceptives

When asked: "If you wish to avoid pregnancy or limit the size of your family, would you be willing to use contraceptives to do this?", fifty-one women answered in the affirmative.[14] They comprise 40.5 per cent of the sample, a slightly larger percentage than the 38.1 per cent who desired no additional offspring. This difference in numerical representation is quite understandable, for some who wished to achieve spacing between pregnancies are included here, although they may not

the urban industrial cultural milieu. The low rate of literacy as well as the low rate of non-agricultural employment serves to isolate this group from the non-traditional urban-industrial cultural influences.

[14] In conjunction with this study, The Family Planning Association of India established a clinic in the village which was staffed by a trained midwife-nurse and by a medical doctor who provided the medical supervision and examinations. As part of the services made available by the clinic, chemical and mechanical contraceptives were provided without cost to those women who desired to use them. The result of this phase of the study will be reported upon at a later date.

Educational Status	Total	Not Willing To Use	Willing To Use	Per Cent Willing To Use of Total
Total	126	75	51	40.5
Not Educated	60	44	16	26.7
First–Fourth Grade	32	20	12	37.5
Fifth–Seventh Grade	23	6	17	73.9
Eighth and Higher	11	5	6	54.5
Chi Square 16.1505			Chi Square Probability $< .001$	

Table 9. The sample population by educational status and by attitude toward the use of contraceptives.

have been included in the group which desired no additional offspring. In addition, some of those who desired no additional offspring were not willing to use contraceptives.

The relationship of education and attitude toward use of contraceptives is presented in Table 9. A highly significant statistical association exists between education and willingness to use contraceptives. The great majority, 67.6 per cent, of the women who were educated beyond the fourth standard of the primary school were in favor of contraceptive usage, while approximately seven out of ten, 69.6 per cent, of those with four standards of education or less were not in favor. Education, it will be remembered, was not significantly associated with desire for additional offspring, Table 8. In contrast, education is the most significantly associated variable with attitude toward the use of contraceptives. It would appear that willingness to use contraceptives involves a component of a non-traditional value orientation, a component which differs from the widespread desire among the village women for a limited sized family.

The association between age at marriage and attitude toward the use of contraceptives was also highly significant (Table 10). The group of women who were 15–19 years of age at marriage were the most favorably inclined, 58.5 per cent, while those who were less than 10 years of age at marriage were the least, 22.2 per cent. This difference is partially explained by the fact

Age At Marriage	Total	Not Willing To Use	Willing To Use	Per Cent Willing To Use of Total
Total	126	75	51	40.5
0–9 Years	9	7	2	22.2
10–14 Years	61	43	18	29.5
15–19 Years	41	17	24	58.5
20 and Over	15	8	7	46.7
Chi Square 10.0770			Chi Square Probability .018	

Table 10. The sample population by age at marriage and by attitude toward the use of contraceptives.

that those marrying after pubescence are apt to have had more education. At the same time in a society in which pre-pubertal marriage was the orthodox and customary procedure, post-pubertal marriage reflects a non-traditional cultural orientation congruent with the expressed willingness to use birth control.

The association between the variables of number of years married and the attitude toward use of contraception was also significant, statistically, as the data in Table 11 indicate. An inverse relationship appears between length of time married and favorable attitude towards contraceptive usage. The majority of those married less than fifteen years were willing to use contraceptives; while the majority of those married fifteen years or more were unwilling to use them. Apparently the most recently married women, whose families were not yet com-

Table 11. The sample population by number of years married and by attitude toward the use of contraceptives.

Number of Years Married	Total	Not Willing To Use	Willing To Use	Per Cent Willing To Use of Total
Total	126	75	51	40.5
0–9 Years	41	20	21	51.2
10–14 Years	29	13	16	55.2
15–19 Years	17	11	6	35.3
20–24 Years	10	7	3	30.0
25 and Over	29	24	5	17.4
Chi Square 11.6961			Chi Square Probability .020	

Number of Total Offspring	Total	Not Willing To Use	Willing To Use	Per Cent Willing To Use of Total
Total	126	75	51	40.5
1–2	39	24	15	38.5
3–4	32	21	11	34.4
5	18	5	13	72.2
6	10	6	4	40.0
7–13	27	19	8	29.6
Chi Square 9.4009			Chi Square Probability .05	

Table 12. The sample population by number of total offspring and by attitude toward the use of contraceptives.

pleted, realized the value of birth control usage in planning their families.

Number of total offspring was also found to be significantly associated with willingness to use contraception, as Table 12 illustrates. Two suggestions emerge from the data; first, a majority (13 out of 18) of the women with five children ever born favored contraceptive usage; second, number of offspring, per se, appears to exercise relatively little influence in the matter of the determination of attitude toward contraceptive usage. It is realized, however, that a relationship of these variables may be obscured by the factor of age differences, i.e., the women with few children tend to be younger than those with many children. The former may tend to have more modern attitudes toward contraception. Unfortunately, the sample is too small to permit adequate control of the variables considered. The

Table 13. Summary table for those variables found not to be significantly associated with attitude toward use of contraceptives by the chi square test of goodness of fit.

Variable	Chi Square	Degrees of Freedom	P Value
Number of Living Offspring	1.5938	4	80.6
Age	1.3199	2	53.0
Number of Living Male Offspring	1.3560	3	72.0
Occupation	7.8287	4	9.9
Caste	.0389	1	>70.0

data of Table 13 reinforce the second conclusion, for both of the variables, number of living offspring and number of living male offspring were found not to be significantly associated with this attitude. In contrast to the value orientation reflected by the variables significantly associated with desire for additional offspring, those significant in their association with attitude toward the use of contraceptives reflect a completely different value orientation. For example, the factors of education, older age at marriage, and fewer years of marriage all reflect non-traditional cultural elements.[15] The variables of age, number of total offspring, number of living male offspring, years married and caste all significantly associated with desire for additional offspring do not reflect a non-traditional value orientation but a universal value orientation postively valuing offspring, found in all agrarian cultures.[16] This universal value orientation here also includes a desire for a limited number of offspring, a component erroneously thought not to exist in the traditional value orientation of the Indian village women. It does exist. Willingness to use contraceptives is a non-traditional value, reflecting a level of awareness of the possibility of positive action to achieve the desired sized family.

Comparison Between Variable Significance in the Male and Female Samples

The variables found to be statistically significant in their association with desire for additional offspring in both the

[15] Education for girls beyond the primary level is still relatively uncommon in village India. For the daughters of agricultural caste families to be educated is still more uncommon. The continuing efforts made by the government to increase the minimum age for marriage indicate the tenacity of the old customs of prepubertal marriage. Finally, the increasing tempo of cultural and social change fostered by the Government of India since independence all combine to fortify the tenet that education, older age at marriage, less years of married life all reflect non-traditional cultural and value orientations.

[16] *See* Sorokin, Pitirim A.; Zimmerman, Carle C.; and Galpin, Charles, J.: A Systematic Source Book in Rural Sociology. Minneapolis: The University of Minnesota Press, 1931, Vol. II, Chapter X, pp. 3–48; Zimmerman, Carle C. and Frampton, Merle E.: Family and Society A Study of the Sociology of Reconstruction. New York, D. Van Nostrand Company, Inc., 1935, pp. 103 ff for the European studies of Le Play. *See* Levy, Marion J., Jr.: The Family Revolution in Modern China. Cambridge: Harvard University Press, 1949, pp. 66–9 for the joy and happiness in the Chinese family over children.

Variable	Significant in Association	Not Significant in Association
Age	Male and Female	
Number of Total Offspring	Male and Female	
Number of Living Offspring	Male and Female	
Number of Living Male Offspring	Male and Female	
Years Married	Male and Female	
Caste	Female	Male
Education	Male	Female
Age at Marriage		Male and Female
Occupation		Male and Female

Table 14. Variables associated with desire for additional offspring in the male and the female samples.

male[17] and the female samples are remarkably uniform as Table 14 illustrates. The importance of number of offspring is clearly evident in the determination of desire for additional offspring among both males and females. The notion that the villager, male or female, desires an unlimited number of offspring was found to be mistaken. In both groups the data provide incontrovertible evidence to the contrary.[18] This does not mean that

[17] Morrison, *op. cit.*

[18] The critical level at which desire for additional offspring changed to desire for no additional among the males was seven total offspring, six living offspring, and three living male offspring, while among the females it was six total offspring, four living offspring, and three living male offspring. Apparently, the women were satisfied with a smaller family than were the males, with the exception of number of living male progeny. When the critical levels associated with willingness to utilize contraception are compared, the males were more concerned with offspring than were the females, for the critical levels for change of attitude from unwilling to willing to use contraceptives were nine total offspring, six living offspring, and three living male offspring but for the females only total offspring was significantly associated, with five offspring group only majority in favor. Here too, the male concern with progeny appears quite clearly, much more so than with the females. In both cases the data provide clear evidence of the existence of a desire for a limited number of offspring.

In The Census of India, 1951, volume I, India, part I–A, report, the concept of "improvident maternity" is developed. Improvident maternity is defined as "a child-birth occurring to a mother who has already given birth to three or more children, of whom at least one is alive." (p. 217) There it is pointed out that approximately 17 out of every 40 births per 1,000 persons in India are of this nature. If this number of improvident births can be reduced greatly or eliminated, the population of India can be stabilized in a fifteen-year period at about 450 millions. The implications of this figure are brought out in the discussion. Birth control in conjunction with maternity and child welfare centers is the approach suggested to achieve this goal. The data presented in this paper indicate that a realization of

(Continued on page 80)

Variable	Significant in Association	Not Significant in Association
Education	Male and Female	
Years Married	Female	Male
Number of Total Offspring	Male and Female	
Age at Marriage	Female	Male
Number of Living Offspring	Male	Female
Number of Living Male Offspring	Male	Female
Caste	Male	Female
Occupation		Male and Female
Age		Male and Female

Table 15. Variables associated with willingness to use contraceptives in the male and the female samples.

the positive evaluation of children found in agrarian village cultures is non-existent. It does exist, but together with it exists the cognizance that too many offspring may be as undesirable for the parent as too few offspring.

There is not uniformity in the male and female samples of variables significantly associated with willingness to use contraceptives (Table 15). Only two variables, education and number of total offspring, were significantly associated in both the male and the female samples. Education is the key apparently, reflecting the non-traditional value orientation associated with the willingness to utilize non-traditional devices, chemical and mechanical contraceptives, to control birth. Among the males, however, number of offspring, total, living, and living male, were very important considerations in making manifest willingness to use contraceptives, but they were very much less so among the females. In the previous paper it was shown that many educated males, with fewer than the critical number of progeny, indicated that they would be willing to use contraceptives once they had attained their desired number of offspring. Number of progeny does not play such an impor-

the implications of improvident maternity exists among the villagers. That a willingness exists to reduce improvident maternity is also evident. Given the means to implement their desires, considerable segments of the population would utilize birth control. The complete report is recommended to those who wish to become familiar with the current demographic situation and its implications for Indian society, reference: Census of India, 1951, volume I, India, parts I–A and I–B report and appendices, New Delhi, Government of India Press, 1953.

tant role with the females. Apparently among the females progeny is not as ego-involving a factor as it is among the males. This is congruent with the culture's emphasis as well.[19] Among the women, the non-traditional value orientation is a reflection of an active rather than a passive viewpoint toward life engendered by exposure to the values, mores, and world view of an anti-traditionalistic educational process. With such an exposure the latent desire for limited offspring can become manifest and operational, within the framework of the more non-traditional value orientation of the educated village women.

[19] The male attained full adult status only with the birth of a son. The man, in the *Shastras,* was thought to be the provider of the seed, whereas the woman was the field in which the seed grew. The man could seek another wife if his present one was childless. All in all, the factors surrounding the need and desire for offspring were more male oriented than female. *See* Buhler, *op. cit.,* pp. 332–5, and Meyer, *op. cit.,* pp. 146 ff.

ANNOTATIONS

METHODS IN PERSONALITY ASSESSMENT[1]

THE studies reported here are directed to the problem of maximizing predictions to criterion behavior from psychological test data. If this were the sum and substance of the volume then it would be of little interest to those who are unconcerned with the specific criterion investigated of school achievement. The authors' purpose, and it is this that raises the book above standard fare in educational psychology and invites the attention of the general reader, is to present an abstract statement of an ideal assessment procedure and of related but less-than-ideal variants and to illustrate each of the methodologies with prediction studies in which they have been incorporated.

The unique feature of the proposed ideal approach to assessment is the emphasis on the explicit and detailed analysis of the specific criterion in each situation. This serves to determine the selection and development of instruments for the assessment program. In other words, major emphasis is placed on a solution to what is usually referred to as the criterion problem. If it seems strange to mark as an advance the fact that much care is given to discovering exactly what it is to which the assessment team is expected to make predictions, it may help to note that the two major assessment programs which antedated the present effort, the research of the Office of Strategic Services (O.S.S.) during World War II and of the Veterans Administration in the years following the war, both foundered on exactly this problem of not being able to define and properly measure their respective criteria. Further, many of the conventional studies of school achievement and of job success are guilty, as alleged by the authors, of accepting an ab-

[1] Stern, George G.; Stein, Morris I.; and Bloom, Benjamin S.: METHODS IN PERSONALITY ASSESSMENT. Glencoe, Ill., The Free Press, 1956, 271 pp. $6.00.

stract and somewhat unreal statement of the criterion rather than an operational standard of performance.

In their particular definition of the criterion situation special stress is placed on the social and interpersonal nature of the process of evaluation. That is, they assume that in all but the most trivial situations the criterion consists essentially of an evaluative standard imposed by one set of persons on the behavior of another set of persons. The implication of this orientation is to direct attention away from job-specific aptitudes to the study of the "whole man"—to the assessment of personality.

The ideal assessment procedure is termed *Analytic.* It includes an intensive analysis of the forces which are likely to affect performance in the situation and of the standards of evaluation actually in operation among the "evaluators." This leads to a description of "good" and "poor" performers as social roles. The next step is to translate these role descriptions into the terms of a personality model, that is, personality types are derived which are presumed on theoretical grounds to represent the hypothetically good and poor performers in the situation. (The authors use a framework of needs for describing personality which covers the broad areas of interpersonal relations, of reactions to inner impulses, and of styles of approach to external goals and stresses. The approach, however, is not dependent on any particular theory of personality.) A large amount of information is now gathered through clinical instruments such as projective tests, interviews, autobiographical essays, and so forth. The personalities of the subjects are compared with the model of the good performer, and predictions are then made on the basis of the "closeness of fit." These predictions represent the consensus of the various members of the assessment team worked out through collective discussion rather than predictions from an automatic statistical weighting of various scores.

It is clear that the *Analytic* approach is time consuming, expensive, and particularly appropriate only where small numbers of subjects are involved. The other assessment methodologies that are presented diverge from this ideal in the interest of practicality. Some compromise is made at one or another point in the sequence described above. Essentially, all of the

compromises are aimed at reducing the amount of time that must be spent in the clinical evaluation of each case by developing paper and pencil tests that may be scored mechanically and that will permit the relation of scores to criterion performance to be evaluated by statistical rather than clinical procedures.

Both the *Empirical* and *Configurational* approaches differ from the *Analytic* in that they substitute for the intensive analysis of the situation a definition of criterion groups of good and poor performers. Tests are administered to these groups and on the basis of the differentiating scores an empirical model of the personality of the effective performer is constructed. The tests are refined, new tests are added, and the study is replicated on a new group to see if the instruments will adequately distinguish effective from ineffective performers. The *Configurational* differs from the other approach only in recognizing the possibility of multiple personality types as meeting criteria of effectiveness. Transposed factor analysis and discriminant function analysis are suggested as possibly more appropriate techniques for problems of analysis in this approach than standard multiple regression procedures. These two approaches do not differ from conventional procedures except in the emphasis on personality and on the operational description of the criterion. The last approach is termed *Synthetic* and seems simply to be a cruder version of the *Analytic*. Rather than deriving a hypothetical model from the analysis of functional roles of effective performers, this approach takes a model from personality theory that is assumed to affect performance, develops personality paper and pencil tests based on it, and then attempts the prediction.

It is beyond the scope of this review to report the substantive details of the various studies that are used to illustrate the different approaches to assessment. It may serve to note that the major criterion is school achievement broadly conceived and that the subjects in the various studies were graduate students in theology, teacher-training, and physics, and college freshmen. In the course of the work a number of new paper and pencil tests were developed which appear to be quite promising. The results of the different studies are uniformly encour-

aging. For example, except for the transposition of one pair of cases they are able to match perfectly the rank ordering by the faculty of an entire class of ten teacher-trainees and using a paper and pencil test developed on previous classes they are able to predict the performance of college freshmen on comprehensive examinations at the end of the school year with a correlation of .63 (the correlation of this examination with the standard ACE scholastic aptitude test for the original sample was .17).

On the whole, this is a good and provocative book. None of the specific studies is beyond criticism from the point of view of design and analysis but since their purpose is illustrative this may be left as a minor fault. The major limitation lies in the inadequate conception of the situational "press." Lip-service is given to the notion that the evaluation process is a social system but no systematic account is provided analogous to the framework of variables for describing personality. The comparison of one situation with another and the consequent cumulation of knowledge about, for example, invariant aspects of the evaluation situation becomes virtually impossible without a more generalized and detailed statement of this side of the equation.

Finally, there is a more general social limitation which follows from the full and explicit acceptance of the criterion in each situation as an unchangeable "given." This book may open a "new chapter" in the history of assessment as is claimed by Professor Henry A. Murray in his Foreword. It is to be hoped that we may look forward to the first chapter of a new history when assessors come to take as their criterion each individual's "best" performance and turn from the assessment of men for situations to the assessment of situations for men.

ELLIOT G. MISHLER

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THE FOCUSED INTERVIEW[1]

DURING the last ten years the techniques and precedures in interviewing have developed tremendously. Much basic

[1] Merton, Robert K.; Fiske, Marjorie; and Kendall, Patricia L.: THE FOCUSED INTERVIEW. Glencoe, Illinois, The Free Press, 1956, 186 pages, $3.00.

research, tested by field application, in this area has been contributed by the Bureau of Applied Social Research at Columbia University. THE FOCUSED INTERVIEW, by Merton, Fiske, and Kendall, is a report of the Bureau. The 1956 revised edition is in reality the third printing of the book.

As stated by the authors, there are four characteristics of the "focused interview":

"1. Interviewees are known to have been involved in a particular situation (have taken part in an experiment, have seen a film, heard a radio program, etc.). 2. Investigator has provisionally analyzed situation and developed hypotheses regarding probable responses to it. 3. This content or situational analysis provides basis for interview guide, setting forth major areas of inquiry and providing criteria of relevance for interview data. 4. Interview focuses on subjective experiences to ascertain interviewees' definitions of situation in which they were involved." (Page ix.)

As its subtitle indicates, the book is "A Manual of Problems and Procedures." However, it is by no means simply a technician's handbook. It is rather a professional person's statement of principles and high level procedures. An underlying point of view of the authors is epitomized in their statement, "A manual for interviewing is not a substitute for the exercise of individual skill and judgment; rather, it provides some tools with which skill and judgment can operate." (p. 18.)

The substance of the book begins with a chapter on "retrospection" by which is meant the client's recollection of his responses to a given situation at the time it was experienced. "Retrospection in the focused interview, then, encourages stimulus-linked and detailed responses by helping the interviewee to *recall* his immediate reactions to the material rather than to *re-consider* the stimulus situation and report his *present* reactions to it." (p. 24)

Next come four core chapters devoted respectively to what the authors regard as the four criteria of productive, as distinguished from unproductive, interview materials. These are summarized as follows:

1. *Range.* Enable interviewees to maximize reported range

of evocative elements and patterns in stimulus situation as well as range of responses.

2. *Specificity.* Elicit specific reports of aspects of stimulus situation to which interviewees have responded.

3. *Depth.* Help interviewees describe affective, cognitive, and evaluative meanings of situation and the degree of their involvement in it.

4. *Personal Context.* Ascertain attributes and prior experience of interviewees which endow situation with these distinctive meanings. (Page x.)

The next chapter is devoted to the advantages and disadvantages of the group interview and to suggested procedures for getting participation from the entire group. There is discussion of means for controlling the loquacious and activating the reticent, for "coping with the interruptions" and for "counteracting the leader effect." The final chapter is concerned with selected problems in conducting interviews. These include opening the interview, controlling the expression of interviewers' sentiments, and the treatment of interviewees' questions.

Since there has been a great proliferation of efforts to secure information through interviews during the past decade, attempts to improve the techniques and to avoid pitfalls are of manifest value. The present reviewer was especially interested in, and also a little skeptical about, some of the discussion in the chapter on retrospection. Having learned from some survey experience how easily cause and effect can be confounded by the rationalization of respondents in *ex post facto* reports he gives three cheers to any effort at getting the individual "to *recall* his immediate reactions to the material rather than to *re-consider* the stimulus situation and report his *present* reactions to it." He is perhaps less optimistic than the authors of this book about any outstanding success in this area.

Since this book is devoted to the improvement of interview techniques, it is of interest to note that some of the larger research organizations attempt to meet the problem of human frailties in interviewing by giving meticulous care to the construction of questionnaire forms. Thus, whereas a previous maxim was to keep the questionnaire brief and to train the interviewers well there seems to be some trend toward great elab-

oration of the schedule and the use of interviewers who can be trained fairly rapidly. To some extent the trend is analogous to the breakdown of the craftsman's job into simple component parts that can be done by the semi-skilled workers on the assembly line.

Whatever may be the trend in interview procedure, there will remain the need for periodic re-examination of principles and methods. In a broad sense that is the contribution that has been made by the present volume.

CLYDE V. KISER

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A FOLLOW-UP STUDY OF WAR NEUROSES[1]

THE stimulus provided by warfare to certain forms of medical and scientific research is strikingly illustrated by this volume. During the second World War approximately 703,000 patients from the United States army and the United States navy and marine corps entered hospital with a diagnosis of psycho-neurosis; 27 per cent of all army discharges for disability and 16 per cent of the navy discharges were on account of neurotic illness; 377,000 of these discharged people were still receiving compensation at the end of 1952, 40 per cent of them with 10 per cent disability-ratings. A problem of this magnitude raises important military and administrative questions and it fitted well into the post-war programme of medical follow-up studies developed by the Committee on Veterans' Medical Problems of the National Research Council. The results of the investigation directed by Drs. Brill and Beebe are now presented as one of the Veterans' Administration Medical Monographs.

The core of the investigation consisted in the five-year follow-up, by clinical interview when possible, of a randomly selected group of 1,475 men admitted to hospital during military service because of a neurotic disability; officers, females, and coloured men were excluded. As one control group the authors included a sample of 397 enlisted men in World War II for a comparison during the period of military service; they were

[1] Brill, Norman Q., M.D. and Beebe, Gilbert W.: A FOLLOW-UP STUDY OF WAR NEUROSES. Washington, Government Printing Office, 1955.

not, however, followed up after their discharge from the service. When the figures pointed to the significance of the pre-service history another group of more than 500 inductees at the time of Korean conflict were given a psychiatric examination. The authors state that their three principal objectives were, firstly, to describe and compare characteristics of the psychiatric and control groups; secondly, to study the circumstances attending psychiatric breakdown, the cause of the illness and the quality of subsequent military service; and thirdly, to determine the fate of the members of the patient population and to estimate their psychiatric status five years after admission. Their most important conclusions are incorporated in the 217 tables around which most of the study has been written. These tables contain the numerous data pertaining to life histories before, during, and after military service which have been coded and subjected to extensive stratistical analysis.

A heavy operational bias is evident throughout the work. The authors proceed by amassing a great deal of information which is given numerical expression whenever possible; hypotheses tend to follow rather than precede data-collection; the search for predictive indices is undertaken with great care. An example illustrates and illuminates the method. Examining what they call "pre-service adjustment" the authors explore family, sex, school, work, social and recreational activity, community activities, and marriage, to obtain ratings of adjustment in each of these sectors of the life history. They provided the examiners with a predetermined set of criteria for guidance. An index termed the "Adjustment Summary" was then derived from these ratings by summation and an assessment was made of its value in the prediction of breakdown during service. With a control group for comparison it was then weighted and incorporated, along with eight other pre-service characteristics similarly treated, into a "pre-disposition rating" for the purpose of psychiatric screening. The statistical method employed in the derivation of this pre-disposition rating is of less interest here than the authors' line of argument: "It is assumed that underlying the qualitative scale is a continuous variable, distributed differently in the two groups of men. . . . If the basic assumption is satisfied approximately (which seems not

unlikely), then this particular quantification should be at least near optimum. But in any case, the final test is whether the quantification results in a useful tool." (page 99) Not until they have found the index to be a "poor device" do the authors go on to admit that no alternative index could be superior for the reason that . . . "stress is of too great importance for a predisposition rating to be very useful in forecasting just who will break down." (page 104)

The effectiveness of the study reflects the quality of the data. It is therefore most successful when the information obtained is most clear-cut. On the issue of compensation, for example, approximately one half of the patient population was receiving an average compensation of $27.60 per month at the time of follow-up. Whereas 16 per cent of the men examined were suffering from neurotic illness without compensation, approximately 30 per cent were considered to be without disability but in receipt of compensation; by inference it is estimated that 15 million dollars compensation were paid in 1953 to men without disability. The receipt of compensation appeared to be unrelated to working efficiency; however, when a comparison was made of matched groups, one of which was returned to duty following breakdown and the other discharged with disability, 72 per cent of the latter and only 28 per cent of the former group were found to be drawing compensation. It is of logistic interest to learn that the admission rate to hospital for neurosis was highest in the first month of service, dropped sharply until the second year of service and then rose again to the earlier level among men with four or more years of service. The curious may even be satisfied with the knowledge that neurotic patients were awarded an insignificantly smaller number of Purple Heart Decorations than the controls.

The clinician will be less satisfied. He will accept and be grateful for the statistical expertness but he will remain concerned about the quality of much of the information. He will certainly wonder, for example, about the reliability of the diagnostic categories employed in the examination of this heterogeneous group of patients by a heterogeneous group of psychiatrists. Personality-classification is a notoriously difficult undertaking but where so much is made of the difference between

neurosis and personality disorder a definition of the "instinct-ridden personality" or of the precise difference between the "overtly passive dependent personality" and the personality with "latent dependency problems" may be justifiably expected. The quantification of intimate, personal material, e.g., parental attitudes in childhood, based on the patient's estimate alone will seem to be of questionable value. The code and coding criteria are not included because of their bulk but those glimpses that are permitted indicate the problems set by such material; thus the criteria for assessing religious influences on family life run as follows: "If there is supporting comment which fails to show evidence of excessive restriction as to thought or behaviour, or guilt-production, the proper choice will be no great influence or positive force. If examiner considers family overtly religious, this additional fact will be recorded." (Page 71) The clinician will not be surprised to discover that all the information provides ". . . no satisfactory explanation for the breakdown of one man and not another similarly exposed."

Nevertheless, the broad conclusions of the study are of considerable interest. The high hopes entertained of the prognostic value of psychiatric screening at induction were not realised; the authors recommend that this procedure be confined to "the elimination of obvious misfits" and that the only test in doubtful cases is a trial at military duty. One million men with unsatisfactory psychiatric histories served in the American Army without breakdown in World War II; the task of the military psychiatrists, it is suggested, concerns itself less with screening than with the optimal utilisation of available man-power. Problems of disposal within the service assume great importance. This view-point entails in turn a shift of attention towards social or group psychology and away from the individual psychology on which psychiatric screening and much psychiatric practice was based. Further evidence in support of this view emerges from the follow-up findings of soldiers discharged from the service with neurotic disability: among these men the general trend towards improvement was related to sociological factors rather than to military experience, degree of disability or the treatment administered.

The successful organisation and prosecution of such a complex study represent a tribute to the skill and pertinacity of the authors. Great care is devoted to method and design; the usual pitfalls of sampling, bias and contamination are anticipated and avoided. Many theoretical issues, however, receive little attention. The complex problems bearing on the clinical and statistical prediction of human behaviour are not mentioned; and difficulties associated with the concepts of stress, predisposition and neurosis itself are for the most part ignored. The outstanding contribution of the investigation resides in the large-scale demonstration which it provides of a much neglected method for the study of neurotic illness. Many of its defects might have been avoided if the ground had been better prepared by sound epidemiological studies. As it is, the work stands as a pioneering effort. For the peace-time psychiatrist its first sentence remains a challenge and a reproach: "Comparatively little is known about the natural history of the neuroses."

MICHAEL SHEPHERD

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TWO VETERANS ADMINISTRATION MEDICAL MONOGRAPHS

THIS monograph[1] described the findings of the Committee on Veterans Medical Problems of the National Research Council in Washington, D.C., relative to the effectiveness of x-ray screening of individuals at induction (July 1, 1942 or after although not later than July 1, 1945) and discharge (May 1, 1943–December 31, 1946) with a diagnosis of tuberculosis in World War II. The rosters comprised 3,099 randomly selected men discharged from the Army with tuberculosis and 3,000 men in the control group who were not discharged with a diagnosis of tuberculosis.

Three general topics are surveyed in this monograph: (1) comparison of x-ray readings of two roentgenologists, (2) effectiveness of the induction and separation screening procedures

[1] Long, Esmond R., M.D. and Jablon, Seymour, A. M.: TUBERCULOSIS IN THE ARMY OF THE UNITED STATES IN WORLD WAR II. Washington 25, D. C., Government Printing Office, 1955, VIII + 88 pp., $1.50.

for tuberculosis, and (3) the epidemiological aspects of tuberculosis in the Army. This review will be primarily concerned with the third topic. One section was devoted to some of the social factors presumed to be of some importance; however, little new material was uncovered. Some previous observations were substantiated, namely, that the incidence of new tuberculosis developing while in service was significantly greater in nonwhite than in white men. It was further found that for white men aged 19–20 at induction, discharges were at a peak seeming "to imply that the incidence rate of new clinical disease is at a maximum at about age 20." However, breakdowns among white men already infected at induction seemed to occur at older ages. No significance was attached to whether a veteran came from a background of urban or rural living. Furthermore, an analysis of the educational background indicated that there was no definite effect in relation to tuberculosis developed while in service. Of interest though in the examination of the factors of height and weight was that the data showed a greater incidence of tuberculosis among the tall and thin men. It was evident too that certain theaters of service manifested a higher incidence of tuberculosis because these men were exposed to a civilian population with a high prevalence of tuberculosis. The influence of the place of foreign service was demonstrated also by the high risk among nonwhites in the Mediterranean area and the low risk in the Pacific area.

The incidence of tuberculosis among the prisoners of war was very high, the estimated risk for prisoners being 3.5 times that for non-prisoners with overseas service. In this study these data are restricted only to the prisoners of Germans because men imprisoned by the Japanese were inducted into the Army before the study was undertaken. The branches and arms of service did not show any relation to the development of tuberculosis with the exception of the Medical Department. There was a high risk of tuberculosis here among both white and nonwhite, probably due to the association and exposure in this Department.

All the x-rays reviewed were read by two roentgenologists, and there were some discrepancies and disagreements between the two. This pointed up the greater reliability of dual readings

of chest x-rays at induction compared with single readings. Despite some difficulties the dual readings were felt to be an adequate substitute measure in lieu of better overall screening, a tuberculin skin test, and a follow-up observation period. In this manner it was hoped that at induction sick men, who are a definite hazard to the health of the other men, would be rejected thereby leaving a reservoir of potentially useful men who could be called upon in case of an emergency.

The second monograph[2] was a study of a representative sample of white, Army servicemen in World War II who survived imprisonment by the Germans and the Japanese, and a control sample of non-prisoners with similar combat experiences. A further characteristic of this study was its total dependence on records and questionnaires. The roster here consisted of 7,691 servicemen in both the European and Pacific theaters.

It was found that the survivors of Japanese prison camps had an excess of mortality during the first two years after liberation. The European prisoners, in contrast, showed no early effect on mortality. The major causes of death responsible for 64 per cent of the post-liberation mortality among the prisoners of the Japanese were tuberculosis and accidents. This high tuberculosis death rate was not unexpected in light of the general conditions in the Pacific prison camps. It was calculated that the "survivors had an approximate tuberculosis incidence of 36.6 per 1,000." Long and Jablon[1] "calculated a tuberculosis incidence rate of 0.74 per 1,000 during World War II among white, male inductees with overseas service and with not less than 25 months of total service." This excluded the Pacific area in as much as data were not available at the time.

To medical researchers interested in the tuberculosis rates and findings among veterans and prisoners of war in World War II, these monographs will be of considerable interest. The facts are most clearly stated. These useful publications, although evidently intended only for the Veterans Administration Medical group, might well be given a wider circulation.

ELISE M. HINKSON

[2] Cohen, Bernard M., Ph.D., and Cooper, Maurice Z., M.D.: A FOLLOW-UP STUDY OF WORLD WAR II PRISONERS OF WAR. Washington 25, D. C., Government Printing Office, 1954, VIII + 81 pp., $1.50.

AGE DISTRIBUTIONS AS AFFECTED BY CHANGES IN FERTILITY AND MORTALITY

THIS is a general note in connection with three papers recently published concerning the effects of fertility and mortality on age distribution.[1] Specifically, however, it refers to the first article by Coale, mentioned in the footnote, in which the author indicates that the current increases in the 65 and over age groups could be due primarily to declining fertility. Theoretically, increases in these age groups could be, of course, a function of either mortality, or fertility, or a combination of both. This can be corroborated by the following partial data abstracted from a study of mine published in 1939[2] in which the age distributions of populations stabilized at different true rates of increase (r's) are given, based on three different life tables. The abstracted data, limited to the age groups of 65 and over, are presented in Table 1 for five different r's (two on each side of r = 0.0, namely, stationary populations), and are based on the 1929–1931 Negro Life Table—of relatively low survivor-

Table 1. Per cent of 65 years and over in populations stabilized at different true rates of increase (r), based on three different life tables.[1]

r's	Per Cent of 65 Years of Age and Over, Based on Life Tables		
	Negro	White	Hypothetical
.0050	5.85	9.41	13.02
.0025	6.54	10.41	14.29
.0000	7.27	11.48	15.68
−.0025	8.08	12.60	17.17
−.0050	8.95	13.80	18.73

[1] Abstracted from: Karpinos, Bernard D.: Stabilized Method of Forecasting Population. *Public Health Reports*, October, 1939, 54, No. 40, pp. 1807–1822, or Reprint No. 2104. The life tables of the Negro and White, used in this study, are the respective United States Life Tables, 1929–1931. The Hypothetical Life Table is that published by Dublin, L. I., and Lotka, A. J.: Length of Life, Chapter 11, Ronald Press, 1936. These r's approximate the following net reproductive rates: 1.15, 1.07, 1.00, 0.93, and 0.87, respectively. (*See* Tables 1 and 2, *op. cit.*)

[1] Coale, Ansley J.: The Effect of Declines in Mortality on Age Distributions. Trends and Differentials in Mortality, Proceedings of a Round Table at the 1955 Annual Conference, Milbank Memorial Fund; Coale, Ansley J.; The Effects of Changes in Mortality and Fertility on Age Composition, Milbank Memorial Fund *Quarterly*, Jan., 1956, 34, No. 1; Stolnitz, George J.; Mortality Declines and Age Distribution, Milbank Memorial Fund *Quarterly*, April, 1956, 34, No. 2.

[2] See footnote to Table.

ship, 1929–1931 White Life Table—of relatively higher survivorship, and Hypothetical Life Table—of high survivorship.

Following down the data given in the table, column by column, one readily notices the expected increases in these age groups due to declining fertility, since the same life table has been used within each column. Increases in these age groups may be noted in following these data across, row by row, reflecting mainly changes due to declining mortality. Greater increases may be expected under analogous conditions from simultaneous changes in both fertility and mortality, provided these changes are in the same direction. Thus, if a population, reproducing itself, say, at r = .0050 and having a survivorship equivalent to the Negro life table, should change to r = .000 and a life table equivalent to that of white population, its per cent of 65 years of age and over would change under stabilized conditions from 5.85 to 11.48.

Of course, these are ideal percentages; the trend, however, toward such distributions may be considered as real.

As stated above, only partial data have been presented in the table. In the mentioned study, a wider range of r's has been used and complete age distributions have been presented in quinquennial age groups. It seems that these age distributions, though theoretical, can be advantageously utilized in general discussions on the expected effects of mortality and fertility on age structures.

BERNARD D. KARPINOS

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LIFE TABLES FROM LIMITED DATA[1]

THE purpose of this monograph is "to develop a way of constructing life tables when conventional methods cannot be applied and primary reliance has to be placed on the information found in a single enumeration." It is assumed "that data on deaths by age are not available and that substitute measures cannot be deduced from successive censuses." Influenced by his training in actuarial methods, the reviewer frankly

[1] Stolnitz, George J.: LIFE TABLES FROM LIMITED DATA: A DEMOGRAPHIC APPROACH. Princeton, Office of Population Research, Princeton University, 1956. Pp. xii + 164. $4.00.

admits that he approached the reading of this book with serious doubts as to the feasibility of such an approach. Dr. Stolnitz has overcome these doubts and proved to the reviewer's satisfaction his case that life tables adequate for most purposes can be constructed from the data of a single census together with such meager supplementary data as may be available in some instances. This achievement probably has required extensive experimentation and entailed a great deal more work than is apparent merely from reading the final product. The fact that a demographer of Dr. Stolnitz' standing has devoted so much effort to this undertaking is in itself an eloquent testimonial to the usefulness of the life table in demographic research.

He prudently warns that "the errors to be expected from single-census methods will often be rather large. Indeed, no more is claimed for the approach than that it is only potentially useful. Whether it should be applied or rejected in any concrete problem will depend on circumstances."

Even at the risk of making this review appear too technical, it seems necessary for an adequate discussion of the proposed method to refer to the basic equation which underlies it. This is

$$\frac{{}_5N_{i+5}}{{}_5N_i} = \frac{{}_5B_{i+5}}{{}_5B_i} \frac{S^{T-5}{}_{i+2.5}}{S^{T}{}_{i+2.5}} {}_5p_{i+2.5}, \qquad i = 0, 5, \ldots$$

where ${}_5N_i$ denotes the enumerated population at time T between exact ages i and $i+5$, ${}_5B_i$ denotes the number of births between i and $i+5$ years before the census, $S^{T}{}_{i+2.5}$ denotes the proportion of these births still surviving at time T: in other words, the quotient of ${}_5N_i$ divided by ${}_5B_i$, and ${}_5p_{i+2.5}$ denotes the 5-year life table survival rate at age $i+2.5$. Except for the quite reasonable assumption that the survival rate for a 5-year age group can be taken as applying to the central age of the group, this equation is a mere tautology. However, as a practical matter it provides a basis for a satisfactory method of constructing life tables from inadequate data.

For convenience, the three ratios which appear in the basic equation are referred to as the "population ratio," the "birth ratio," and the "survival ratio," respectively. The population ratio is, of course, available from the data of a single census. If the other two ratios can be estimated with sufficient accu-

racy, the equation can be solved for the life table survival rate. This is Dr. Stolnitz' procedure. If birth data are available, they can be used to compute or estimate the needed birth ratios. In this case, however, the effect of migration between the birth of the cohort and the date of the census may be a troublesome problem, and a whole chapter is devoted to possible methods of dealing with this problem. However, the author recognizes that there will be many situations in which adequate birth data will not be available, and proposes estimating the birth ratio in such cases by the formula:

$$\frac{1}{2}\left(\frac{\text{Population Ratio}}{\text{Survival Ratio}}+1\right).$$

The adequacy of this approximation has been thoroughly tested by application to a number of actual cases for which the correct results are known, and the error involved is less than might be supposed. In particular cases, there may be a basis for selecting weights other than $\frac{1}{2}$ and $\frac{1}{2}$ for the two terms in the formula. In general, the survival ratios will have to be estimated on the basis of data for other populations thought to have similar characteristics (e.g., data for neighboring countries).

This abbreviated and oversimplified presentation does not do justice to the careful attention that has been given to numerous details and practical problems that will arise in applying the procedure under a variety of conditions, and to extensive practical tests in which the suggested methods were applied to populations with known survival rates in order to appraise the limits of error involved. This publication is a most important contribution to demographic analysis of underdeveloped areas.

As examples of the technique, the author has developed two original life tables which are important contributions in themselves: one for the native white population of the United States, 1885–1889, and the other for the native-born population of Brazil, 1936–1940. The latter is of particular interest, inasmuch as Brazilian mortality on a national level has always been an unknown quantity. The conclusion that "the level of Brazilian mortality about 1940 was among the highest recorded

in any part of the world" is plausible to the reviewer on the basis of limited personal observation in certain rural sections of that country.

The material is well organized and presented. The inclusion of summary paragraphs at the end of the more important chapters is extremely helpful. Discussion of the most difficult technical aspects has been relegated to appendixes following certain of the chapters. Notwithstanding this excellent organization, there were paragraphs here and there that the reviewer found it necessary to read several times in order to grasp the intended meaning. This may be due as much to the inherent difficulty of the subject as to the quality of the exposition (generally excellent).

The reviewer finds himself somewhat out of sympathy with the author's severe strictures (p. 19) against the "usual argument" that terminal age estimates introduced for the purpose of deriving measures of expectation of life have only small effect on the accuracy of the summary measure, even when wide of the mark as age-specific indexes. The point he attempts to make does not seem essential to his general argument and is somewhat weakened by his finding two pages later that "even large terminal errors beyond age 77.5 will have only insignificant effects on $\mathring{e}_{2.5}$." On the other hand, there can be little argument with his suggestion that ${}_{65}\mathring{e}_{2.5}$ possesses substantial advantages as a measure of longevity, especially in the case of populations for which demographic data are meager.

The concluding paragraph of the report is worth quoting in full:

> "In conclusion, it should be re-emphasized that the use of single-census methods for any of these purposes will involve results whose accuracy is somewhat uncertain. There can be no doubt the state of demographic knowledge will be far richer when such methods can be discarded. On the other hand, they should provide much valuable information for many years to come."

T. N. E. Greville

BOOKS

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